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ARCHIVES OF OTOLARYNGOLOGY

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PURULENT MENINGITIS

CONTRIBUTION TO THE CLINICAL PICTURE

E. SCHMIEGELOW

COPENHAGEN

Before Quincke invented the lumbar puncture in 1891, the knowledge concerning purulent meningitis was incomplete.

Prior to that date only the fatal purulent meningitis was recognized as a real meningitis, and the patients who during the course of an acute or chronic purulent otitis showed symptoms of meningitis but recovered were not considered to have suffered from purulent meningitis. It was thought to be only a serous meningitis or meningeal irritation.

Thanks to lumbar puncture and to examination of the cerebral spinal fluid, a number of patients, although suffering from an aural purulent meningitis (high pressure of the spinal fluid, excessive number of leukocytes and bacteria), can now be cured if operated on in time.

During the last decades, systematic examination of the spinal fluid of aural patients has considerably altered the views on meningitis, its symptomatology, diagnosis, prognosis and treatment.

When general practitioners speak of purulent meningitis, they usually mean an acute disease with a typical aspect, characterized by high temperature, violent headache, spasms, universal convulsions, rigidity of the neck, Kernig and Babinsky signs, optical neuritis and choked disk, and, later, paralysis of the functions of the brain, coma and death.

There is a series of meningites, however, which offer different aspects, and which are therefore overlooked by a general practitioner. Time and again patients are admitted to the aural clinic with symptoms which seem to indicate a purulent meningitis least of all; the existence of this condition is proved only by lumbar puncture.

In this paper, I shall present only a few views concerning the symptomatology and treatment of purulent meningitis, based on my experience with a great number of patients whom I have treated in St. Josefs Hospital and the University aural clinic in Copenhagen.

Meningitis is divided into two groups: (1) the septic variety, in which the spinal fluid contains cocci and bacteria, and (2) the aseptic form without either bacteria or cocci.

(1) The symptoms and the clinical aspects of septic meningitis are so well known that I am unable to add anything new to the picture.

Although septic meningitis generally has a more constantly fatal course and nearly always ends quickly in death, exceptions and deviations from the general rule are sometimes found even in this group.

As an example of an unusual case I shall give the outlines of the history of the case of a girl, aged 7, who was admitted to the hospital suffering from an acute septic meningitis which broke out the day before she was admitted and four days after the onset of acute suppuration of the middle ear. She was in a serious condition with a temperature of 40.5 C. (104.5 F.) and petechia all over her body; the labyrinth was not affected. The spinal fluid was milky, the pressure being from 500 to 600 mm. The cell count gave 5,200 cells per cubic millimeter, chiefly polymorphonuclear leukocytes, but cocci were found also and were proved by culture to be hemolytic streptococci.

An operation on the mastoid was performed at once. The dura and sinus were normal. As it was a serious case of septic meningitis, I dared not wait until an autogenous vaccine had been produced, but

TABLE 1.—*Lumbar Punctures Made on a Girl, Aged 7*

	Date	Pressure	Number of Cells*		
1	11/25	500-600	5200/3	Not clear	Streptococci, chiefly polymorphonuclear cells
2	11/26	600	9200/3	Not clear	Chiefly polymorphonuclear + cocci
3	11/27	520	5800/3	Not clear	Chiefly polymorphonuclear
4	11/28	?	2600/3	Not clear	Chiefly polymorphonuclear + a few cocci
5	11/29	300	980/3	Clear	Chiefly polymorphonuclear, no cocci, no growth
6	12/ 1	300	312/3	Clear	Chiefly polymorphonuclear
7	12/ 9	...	.....	.....	Fluid mixed with blood
8	12/20	300	6/3	Clear	

* In this and the following tables the 3 after the figures indicating the number of cells means the number per cubic millimeter.

at once injected 50 cc. of polyvalent streptococcus serum into the veins. In the course of from four to five days, the temperature fell, and she was well.

The temperature curve and the table giving the results of the lumbar punctures which were made daily clearly demonstrate the course of the disease (chart 1 and table 1).

That the patient's life was saved in spite of the violent septic meningitis was due to several circumstances: (1) because the primary focus, the suppuration of the middle ear, was drained immediately; (2) because the pressure on the central nerve system was relieved daily by lumbar puncture and the drainage of great quantities of the spinal fluid (from 20 to 30 cc.), and (3) because the patient was a child, and experience has shown that in the case of a child the prognosis is somewhat better than in an adult. Finally, the fourth circumstance, which possibly may have been of special importance in this case, was the use of a polyvalent streptococcus serum, of which 30 cc. was injected into the veins immediately after the operation.

Some years ago I published the report of a case of severe septic angina. The patient, a man, aged 50, was dying of pyemia. I injected polyvalent streptococcus serum into the veins and muscles and he recovered.

(2) Two years ago I read a paper in the Medical Society in Copenhagen on the clinical aspect of the aseptic meningitis, especially with regard to the recidivating forms and their obscure origin. My object was to call attention to the varying and polymorphic symptoms. I described a case of meningitis of aural origin in a girl, aged 17, with a history that especially illustrated the disproportion between the patient's subjective well-being and the serious pathologic condition of the

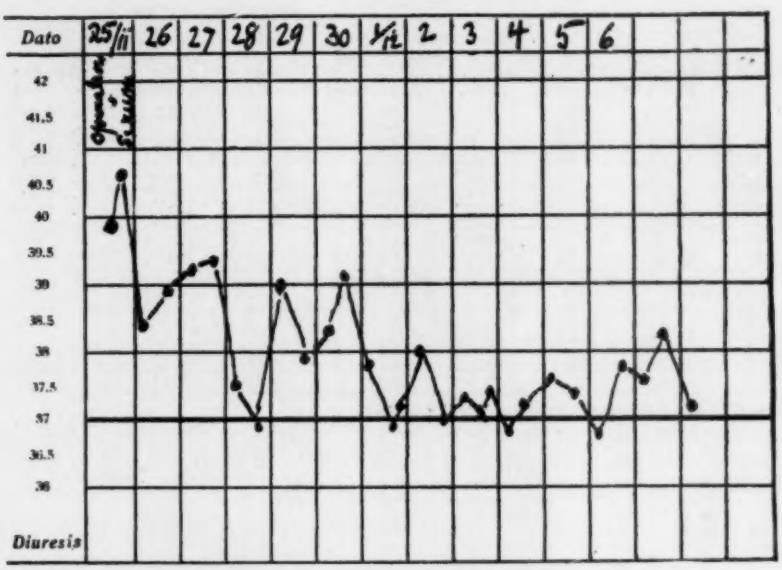

Chart 1.—Temperature curve in purulent meningitis in a child, aged 7 years.

spinal fluid. The patient had undergone a series of operations for endocranial complications two years before, caused by an acute suppuration of the middle ear, and when sent home had a hernia of the brain the size of a hen's egg. Since then she had felt well until she was admitted to the hospital on account of slight fever (39 C.) and tenderness on pressure on the prolapsed part of the brain. Although there was absolutely no external sign of a purulent meningitis and she felt well, quantities of polymorphonuclear leukocytes were found in the milky spinal fluid. Ten lumbar punctures were made during the following days, and the pressure, which in the beginning was 200 mm., increased to 350 mm., and in the course of three weeks fell to normal.

The spinal fluid was milky but sterile at first, and the patient felt well all the time.

This case is an excellent example of a decidedly aseptic purulent meningitis which did not cause any of the ordinary symptoms, and if the meningeal nature of the disease had not been proved by means of the lumbar puncture, there would be every reason to doubt the existence of the purulent meningitis.

Now and then one finds recidivating otitic purulent meningitis which continues for weeks and months.

TABLE 2.—*Lumbar Punctures Made on a Girl, Aged 18*

	Date of Lumber Puncture	Spinal Fluid			Proportion Between		
		Pressure, Mm.	Quantity, Cc.	Appearance	Polymorphonuclear Cells, Percentage	Mononuclear Cells, Percentage	Number of Cells
1	4/25	200	5	Milky	70.4	22.2	c. 25600/3
2	4/26	220	8	Milky	28.4	66.7	c. 2560/3
3	4/27	230	4	Milky	27.5	72.5	c. 4608/3
4	4/29	270	35	Milky	?	?	c. 3840/3
5	5/ 2	350	"few"	Milky	8.2	91.8	c. 4600/3
6	5/ 5	170	"few"	Milky	1	99	c. 240/3
7	5/11	70	"few"	Contains blood	0	100	c. 240/3
8	5/21	10	"few"	Clear	0	100	38/3
9	6/ 7	?	"few"	Clear	0	100	35/3
10	6/14	15	"few"	Clear	0	100	3/3

TABLE 3.—*Lumbar Punctures Made on a Child, Aged 2*

Number	Date	Pressure	Cell Number	Milky	Clear	Percentage Sugar	
1	10/13/24	...	700/3	+	—	.....	
2	10/15	...	.....	—	—	.....	
3	10/17	350	11500/3	+	—	.....	
4	10/19	300	11500/3	+	—	.....	
5	10/22	200	3200/3	+	—	.....	
6	10/25	200	1700/3	+	—	.....	
7	10/29	200	14336/3	+	—	.....	
8	11/ 1	200	6400/3	+	—	.....	
9	11/ 2	190	.....	—	—	.....	Mixed with blood
10	11/ 3	400	.....	—	—	.....	Mixed with blood
11	11/ 5	...	.....	—	—	0.047	Mixed with blood
12	11/12	200	228/3	—	+	0.031, 0.033	
13	11/17	250	17000/3	+	—	0.009	Mixed with blood
14	11/19	300	152/3	—	—	0.007	
15	11/27	200	98/3	—	+	0.023	
16	12/ 5	250	43/3	—	+	.....	Chiefly polymorphonuclear
17	12/13	...	27/3	—	—	.....	Pure blood
18	12/16	250	.....	—	+	.....	Some erythrocytes
19	1/ 2/25	300	.....	—	+	.....	Partly polymorphonuclear

In a case of meningitis of aural origin in a child, aged 2 years, whom I operated on in 1924, the patient was evidently well except for the first few days, although the cell count of the spinal fluid showed an excessive number of leukocytes.

The results of nineteen lumbar punctures made in the course of two and one half months (from Oct. 13, 1924, to Jan. 2, 1925) are given in table 3. The number of cells at first was 700; four days later, it increased to 11,500 and on October 25 it decreased to 1,700; on the following day, however, the number increased to 14,336. During

November, it decreased, being 228 on November 12, with a pressure of the fluid of only 200 mm., but on November 19, it suddenly, without any apparent reason, increased to 17,000 and the pressure rose to 300 mm. After this enormous exacerbation, the number of cells decreased quickly, but on Jan. 2, 1925, about three months after the beginning of the disease, a distinct pleocytosis (27 cells per cubic centimeter) still existed; at that time the wound and the middle ear were entirely healed.

The temperature curve (chart 2) was different from what one would expect during a purulent meningitis; it was more like that of a sinus thrombosis. A thrombosis could not be found, although the sinus was opened; attempts to cultivate bacteria from the blood gave negative results.

The percentage of sugar in the spinal fluid was far below normal, a condition which is always seen in otitic purulent meningitis, while an

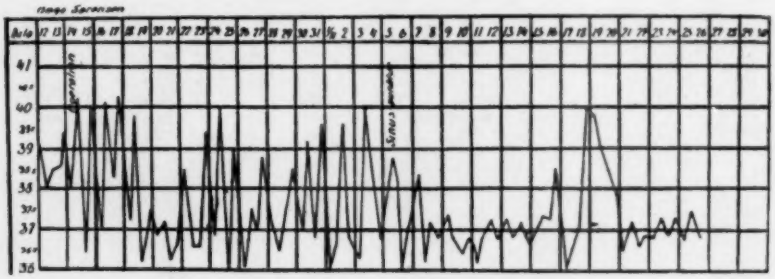

Chart 2.—Temperature curve in purulent meningitis in a child, aged 2 years.

increase of the percentage of sugar is found in aseptic, nonotitic meningitis and in cases of epidemic encephalitis.

Another case of aseptic purulent meningitis of aural origin was remarkable on account of the extreme variations in the number of cells in the spinal fluid, and the long duration of the condition.

A man, aged 25, who suffered from chronic suppuration of the middle ear, developed a purulent labyrinthitis eight days before he was admitted to the hospital. Operation was performed on April 29, 1927, and a labyrinthine operation ad modum Neumann was performed by Dr. F. Norsk.

Lumbar puncture was performed every day for a month, and each time from 20 to 60 cc. of fluid was evacuated. The cell counts and pressure are shown in table 4. The difference in the number of cells from day to day is illustrated in chart 3.

The greatest number of cells was 23,000 per cubic millimeter. The curve began to fall regularly only after the eleventh lumbar puncture, but two months after the beginning of the disease, at the time

when the patient felt subjectively well, a pleocytosis of the spinal fluid still existed.

When the number of cells increased, the pressure usually was elevated also, and it declined in accordance with the decrease in the number of cells.

There is one group of aseptic meningitis in which recidivation occurs and the etiology of which is obscure. I observed a case of this disease

TABLE 4.—*Lumbar Punctures Made on a Man, Aged 25*

Date	Number	Pressure	Cells	Appearance of Spinal Fluid
4/29	1	500	20000/3	Milky
4/30	2	500	7700/3	Less milky
5/ 1	3	500	1540/3	Clearer
5/ 2	4	550	1720/3	As yesterday
5/ 3	5	400	2400/3	Slightly cloudy
5/ 4	6	650	2300/3	Very milky
5/ 5	7	450	23000/3	Very milky
5/ 6	8	450	12800/3	Milky
5/ 7	9	550	9500/3	Milky
5/ 8	10	Not measured	3664/3	Clearer
5/ 9	11	780	22000/3	Very milky
5/10	12	550	8200/3	Clearer
5/11	13	800	10700/3	Clearer
5/12	14	500	4990/3	Clearer
5/13	15	275	9400/3	Milky
5/14	16	475	2300/3	Clearer
5/15	17	330	4200/3	Slightly milky
5/16	18	Not measured	1280/3	Mixed with blood
5/17	19	350	688/3	Yellow, clear
5/18	20	350	2304/3	Milky
5/19	21	300	848/3	Clearer
5/20	22	280	544/3	Clear
5/21	23	220	512/3	Clear
5/22	24	200	280/3	Clear
5/23	25	250	232/3	Clear
5/24	26	300	240/3	Clear
5/25	27	180	213/3	Clear
5/26	28	200	220/3	Clear
5/27	29	250	1100/3	Mixed with blood
5/28	30	400	465/3	Mixed with blood
5/29	31	Not measured	1356/3	Mixed with blood
6/ 1	32	150	230/3	Yellow, clear
6/ 3	33	200	640/3	Clear
6/ 7	34	275	65/3	Yellowish, clear
6/11	35	180	125/3	Yellowish, clear

TABLE 5.—*Alterations in Spinal Fluid of a Woman, Aged 29*

Date	Cell Number	
5/29	450/3	No bacteria, mostly lymphocytes
6/ 1	110/3	Mostly lymphocytes
6/ 7	43/3	Equal polymorphonuclear and mononuclear cells
6/13	32.3	
6/20	11/3	
7/19	1/3	

for the first time in a woman, aged 29, who in November, 1922, was attacked by giddiness, daily vomiting, headache, photophobia and a high temperature (38.5 C., 101.3 F.). She had now and then had a slight purulent discharge from the left ear, but this had ceased. Her physician had made a lumbar puncture and the fluid found clear; it contained twenty-seven polymorphonuclear leukocytes per cubic centimeter, but no bacteria. The symptoms disappeared in the course of a

fortnight. Otoscopic examination did not show any abnormality with the exception of a dry perforation of the left drumhead. Five months later, she was admitted to St. Josefs Hospital, suffering from the same symptoms, rigidity of the neck and Kernig's sign. The middle ear was dry, and she could hear whispering at a distance of 3 meters.

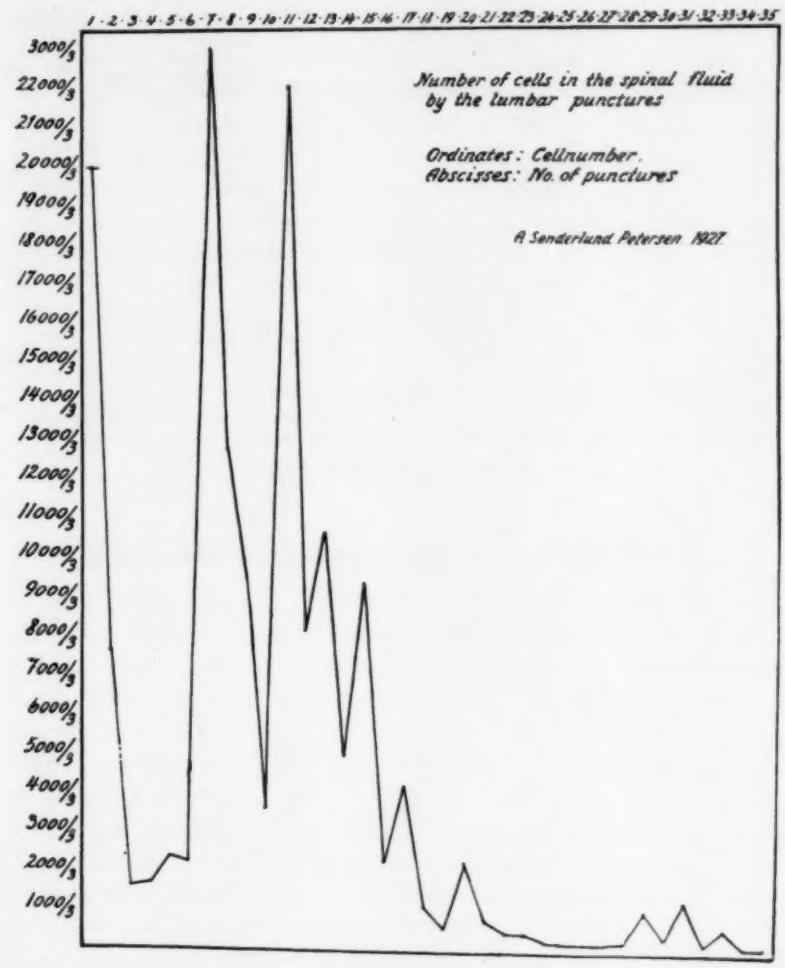
Number of cells in the spinal fluid by the lumbar punctures
Ordinates: Cellnumber.
Abscisses: No. of punctures
A Senderlund Petersen 1927

Chart 3.—Curve showing difference in cell number. The 3 following the ordinates indicates that the figures show the number of cells per cubic millimeter.

The spinal fluid showed the alterations indicated in table 5.

Her condition when she entered the hospital, six months after her first attack, suggested influenza. Only by means of the lumbar puncture was it possible to verify the nature of her disease—an aseptic meningitis —and its gradual diminishing. There was no question of otitic origin.

While this patient had only two attacks of aseptic meningitis in which recidivation of obscure etiology occurred, Dr. S. Engel, who has been my assistant for years, has had the opportunity to treat privately a woman, aged 39, who has never suffered from diseases of the ear or nose, but who during four years has had seven attacks of meningitis characterized by violent headache and elevated temperature. The attacks occurred suddenly without warning. During these attacks, the

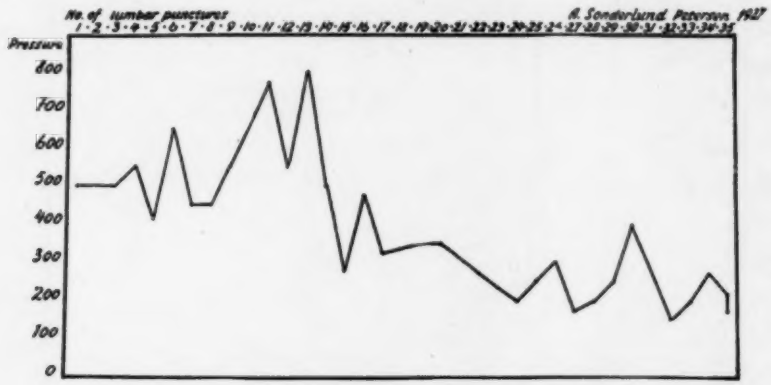

Chart 4.—Curve showing the spinal fluid pressure.

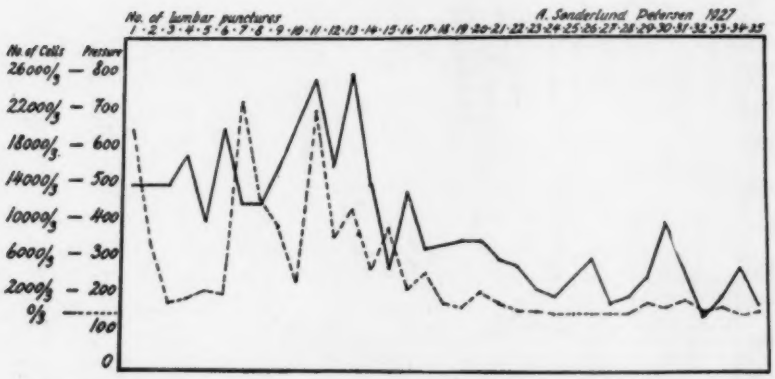

Chart 5.—Curve showing the number of cells and pressure. The stippled line indicates the number of cells.

temperature rose to 40 C. (104 F.) and she usually vomited. After staying in bed for about two weeks and using acetylsalicylic acid and other remedies, the symptoms gradually disappeared, and she recovered.

The first attack was observed on Feb. 4, 1921; the second, on Jan. 12, and the third, on September 29, 1922; the fourth, in April, 1923; the fifth, on May 20 and the sixth, on October 20, 1924, and the seventh, in February, 1925.

The intervals between the attacks varied from one to fourteen months and were separated by periods during which the patient was well.

At first she was treated for a severe attack of influenza. During the second attack (Jan. 12, 1922) the headache was so intense that she had to be given morphine, and although symptoms of meningitis could not be found, a nerve specialist was consulted. He, however, did not think the condition was meningitis. In the course of eighteen days, the attack passed under symptomatic treatment with ice, antipyrine and morphine. During the following attacks, lumbar puncture was performed, and each time the spinal fluid was found to be milky, containing numerous white blood cells of the mononuclear type, but no bacteria. The last attack that I observed before this article was written ended on Dec. 7, 1923. According to Dr. Engel, she was well until the middle of February, 1925, when she had a similar attack, the course of which was exactly like that of the former ones. She has not had an attack since then.

TABLE 6.—*Lumbar Punctures on a Woman, Aged 26 (Quincke)*

Date	Pressure at the Beginning, Mm.	Final Pressure, Mm.	Evacuated, Cc.	Spinal Fluid	Leukocytes	
					Polymorphonuclear	Mononuclear
8/ 9	210	85	19	Milky	5,600	0
9/11	250	110	18	Slightly milky	1,160	A few

In the Scandinavian literature, reports of a number of cases of aseptic meningitis (Arvid Wallgrén, Nauclér and N. Antoni) have been published, the etiology of which was unknown and which have been described as rheumatic fever by the physicians who treated the patients. The diagnosis can be made only by means of lumbar puncture. It has been supposed that these might be cases of abortive poliomyelitis or of epidemic encephalitis, but when, as in my two cases, one has to deal with aseptic meningitis in which recidivation occurs, this explanation is not plausible, as neither epidemic encephalitis nor poliomyelitis can cause attacks which last for two weeks and then disappear without leaving any traces, only to recur suddenly.

In looking through the literature I found, however, that fifteen years ago Quincke [1] observed aseptic meningitis in which recidivation occurred in a woman, aged 26, otherwise healthy, who for two years had suffered from attacks every four weeks, often in connection with menstruation. The attacks began with shivering, a rise in temperature to 40 C., vomiting and rigidity of the neck. The symptoms dis-

1. Quincke: Deutsche Ztschr. f. Nervenh. **36**:345, 1909.

appeared after a few days. During two of the attacks, lumbar puncture was performed.

Quincke called the disease meningitis paroxysmatica, and could not find a plausible etiology. The disease resembled a violent influenza, and it is possible that if one made a lumbar puncture on all patients with violent influenza one might find symptoms of aseptic meningitis. Lumbar puncture is necessary for a correct diagnosis, but as far as I can see, it is not important in regard to treatment.

Finally, I wish to call attention to the diagnostic importance of the lumbar puncture in recognizing certain forms of abscesses of the brain and subdural abscesses.

My former assistant, Borries,[2] has drawn attention to this point in a series of papers published since 1917.

Borries has collected a number of observations partly from the literature and partly from personal experiences in the otologic clinics of Copenhagen, concerning patients who suffered from pronounced purulent meningitis of otitic origin. These cases of meningitis were benign so far as they remained aseptic and cleared up even if the disease ended in death. This was confirmed by a series of lumbar punctures. At postmortem examination, it was shown that these patients had suffered from an abscess in the brain or a subdural abscess.

Borries maintained that if a purulent meningitis proves to be benign (clearing of the spinal fluid) while at the same time the clinical symptoms of an endocranial complication increase, this proves that the condition cannot be an uncomplicated meningitis, but that it is probably a secondary collateral meningitis caused by another disease of the brain, probably an abscess in the brain or a subdural abscess.

If the purulent meningitis improves, as shown by daily lumbar punctures, while at the same time the cerebral symptoms increase, an abscess of the brain is present.

It is a common experience to have a patient brought to the hospital with pronounced symptoms of a severe endocranial complication, high temperature, sensorium cloudy, cramps, neuritis optica, nystagmus and other symptoms. One cannot make out what is the matter; abscess of the brain, a meningitis, a sinus thrombosis and other conditions are considered and a lumbar puncture is performed at once. A quantity of milky fluid is evacuated, and the fluid is found to contain a number of polymorphonuclear leukocytes and to be under high pressure. The patient's condition clears up after tapping from 20 to 30 cc. of fluid. and after other lumbar punctures the spinal fluid becomes clearer; sometimes the cells disappear, the fluid becomes aseptic and the pressure

2. Borries: Ztschr. f. Ohrenh., 1917, vol. 76; Arch. f. Ohrenh., vol. 104; Ztschr. f. Hals-, Nasen- u. Ohrenh., Kongressbericht, 1925, pt. 2, vol. 12.

decreases. One is now inclined to believe that one is dealing with an aseptic meningitis, but in spite of improvement, the patient's condition becomes worse, and he dies a week or two later with increasing symptoms of the brain. At postmortem examination, an abscess in the brain or a subdural abscess is found.

Several such patients have been observed who died from the primary abscess of the brain when there was improvement in the secondary meningitis, or when, from a clinical point of view, the patient was cured, as it was impossible to find macroscopic meningeal alterations at postmortem examination.

In my opinion, Borries' rule has given a new clinical method of diagnosing abscess of the brain in certain cases in which other symptoms are not found.

CONTRACTION OF THE VISUAL FIELDS IN CASES OF PROGRESSIVE DEAFNESS

REPORT OF CASES AND A COMPARISON WITH CASES OF DEAFNESS OF OTHER TYPES

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NEW YORK

According to the understanding herein implied, progressive deafness is a condition in which the organ of hearing gradually becomes more deficient in its capacity to perceive and to convey sounds to the brain. It is caused by some constitutional abnormality and therefore may also be termed "constitutional" deafness. It occurs more frequently in women than in men. It may begin at any age, but it more commonly has its onset during late adolescence or early adult life. Its onset is insidious, the patient not experiencing its presence until a fairly large portion of the hearing ability has been incapacitated. One of the first symptoms is tinnitus, which is annoying. Dizziness may be an early or late symptom, but it is not common. Paracusis is a frequent experience.

Those who have no inflammation of the middle ear have normal drums and patent eustachian tubes. At times, a pink zone is seen through the drum in the region of the promontory.

The classic symptoms are raising of the lower tone limit, prolongation of bone conduction, negative reaction to the Rinne test, a history of hereditary deafness, high uric acid and either high or low calcium content of the blood.

This entire picture may not be present, and when one or more of the symptoms are absent, the diagnosis may be doubtful. This is particularly true in incipient cases.

The purpose of this report is: (1) to call attention of otologists to the concomitant presence of contraction of the visual fields in cases of progressive deafness, and (2) to stimulate others to make examinations of the visual fields in cases of deafness of obscure origin so that by an increase in the number examined and reported, the value of the appearance of the visual fields as a diagnostic aid may be properly estimated.

The histories in this report include those in five cases of progressive deafness and in five of other forms of deafness. In addition, the patients in eight other cases were examined, the histories of which are not reported. They include two cases of hay-fever, with no history of deafness; one case of chronic purulent otitis; one case of nerve deafness following acute purulent otitis media and four other cases in which the subjects were apparently well. All of these persons had normal visual fields for form and color. There is a significance in the fact that

in all of the cases in which the condition was previously diagnosed as progressive deafness, the visual fields were found to be contracted.

METHOD

The method pursued in the examination of these patients was as follows: The blood was obtained for chemical examination in the morning before breakfast, a period of more than twelve hours having elapsed since food was taken. The same watch was used in all cases to determine the hearing capacity. It was selected instead of the whispered voice because of the lack of variability of the intensity of the sound of the watch. The maximum distance at which the conversational voice could be heard was estimated by speaking on residual air, and when the distance exceeded 20 feet, the test was continued by speaking at a right angle to a line drawn from the patient to the examiner. When the patient heard the spoken voice under this condition, it was considered that the spoken voice was heard at a distance of 30 feet. When the examiner spoke with his back turned to the patient at a distance of 20 feet, and this was accurately perceived, it was presumed that the patient was able to hear the spoken voice at a distance of 40 feet. During this test the Bárány noise apparatus was held in the ear that was not tested. The patient was not allowed to see the examiner's lips while the test was in progress.

The normal values for the various tuning forks were determined on apparently normal persons, and an average was struck. The method pursued in testing with forks was the making of an estimation of the time that a patient could hear a particular fork when it was held as near to the ear as possible without touching it. The space between the tines of the fork was held toward the ear. A stopwatch was started at the time that the fork was struck and stopped when the patient indicated that the sound was no longer heard. The fork was caused to vibrate by a light blow on the knee of the operator. An effort was made to imitate the intensity of the blow during every test. The Edelman whistle was used in determining hearing perception for tones above 2,048 double vibrations.

Dr. Sigmund Agatston, who was kind enough to examine the eyes of all patients reported in this series, describes his method of examination as follows:

The normal limitations of the fields for white are 45 to 55 above, 50 to 60 below, 65 to 80 temporal and 45 to 60 nasal. The normal fields for red are 25 to 35 above, 25 to 35 below, 30 to 40 temporal and 25 to 30 nasal. Normal fields for green usually correspond to the fields for red, but are slightly smaller, the average difference being 5 degrees.

The instrument used in the ordinary examination is the simple perimeter, with objects 1 cm. square. In my examination of Dr. Gottlieb's series of cases, when I found sluggish cooperation on the part of the patient, I used a 2 cm. object in my attempt to get as large a field as possible.

Some patients will show an apparently contracted field. This may be due to the anatomical placement of the eye, such as deep sunken eye, over-hanging eyebrow, etc.

REPORT OF CASES OF PROGRESSIVE DEAFNESS

The first five cases are presumably cases of progressive deafness.

CASE 1.—Mr. F. G., aged 25, a salesman, was examined on Jan. 26, 1928. He had had difficulty in hearing with both ears for the past two and a half years.

The onset was insidious. He had had repeated colds accompanied by nasal discharge but these did not make his hearing worse. He suffered with sore throats until his tonsils were removed in July, 1927. His hearing was not improved by this operation. The patient was constipated. There was no history of hereditary deafness. He had never had tinnitus, vertigo or paracusis. Both ear drums were slightly retracted. The eustachian tubes were patent. The maxillary sinuses were cloudy to transillumination. The Wassermann reaction

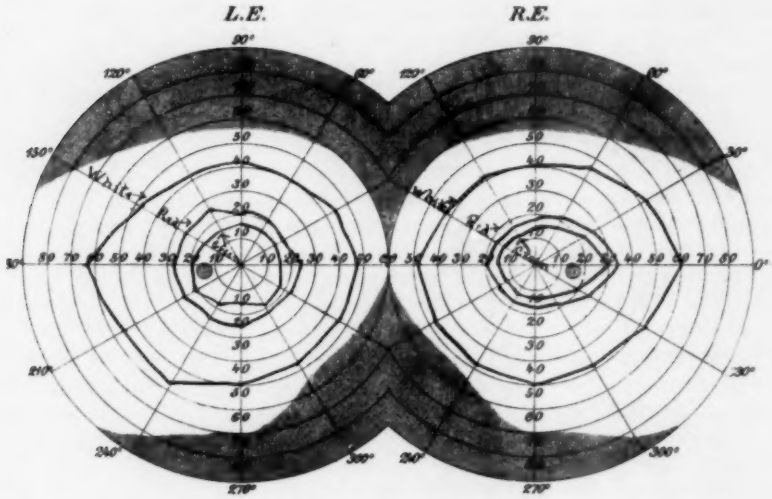

Fig. 1 (F. G.).—Slight contraction of form and color fields.

TABLE 1.—*Results of the Hearing Tests in Case 1, Series 1*

	Right	Left	Normal
Conversation	8½ feet	9½ feet	
Watch	6 inches	12 inches	
256 double vibrations: air	15 seconds	12 seconds	22 seconds
bone	12 seconds	13 seconds	15 seconds
26 double vibrations	Negative	Negative	
48 double vibrations	Negative	Negative	
64 double vibrations	Negative	Negative	
128 double vibrations	Positive	Positive	
1,024 double vibrations	25 seconds	20 seconds	50 seconds
2,048 double vibrations	27 seconds	18 seconds	30 seconds
15,000 double vibrations	Positive	Positive	
20,000 double vibrations	Positive	Positive	
Weber test	Not referred		

was negative. The urine was normal. The chemistry of the blood showed: calcium, 6.8 mg. per hundred cubic centimeters (normal from 8 to 10); uric acid, 4.4 mg. per hundred cubic centimeters (normal from 1 to 3).

The results of the hearing tests are shown in table 1.

The results of examination of the eye were as follows: the vision in both eyes was 20/15; the fundi were negative and the visual fields on both sides were somewhat contracted. This would imply a slight degeneration of some of the central fibers in the optic nerve.

CASE 2.—Miss P. W., aged 27, a bookkeeper, had had vasomotor rhinitis for the past three years. During the past two years she had noticed a gradual reduc-

tion in the hearing capacity in both ears. This began with tinnitus, which recently had disappeared. The patient suffered from obstinate constipation. Her father had asthma. There was no history of deafness in the family.

The ear drums appeared to be normal. The eustachian tubes were patent. There was a small polyp in the right middle meatus. In 1925, the urine showed a faint trace of albumin and a few hyaline casts. In November, 1927, the urine was normal. The Wassermann reaction was negative.

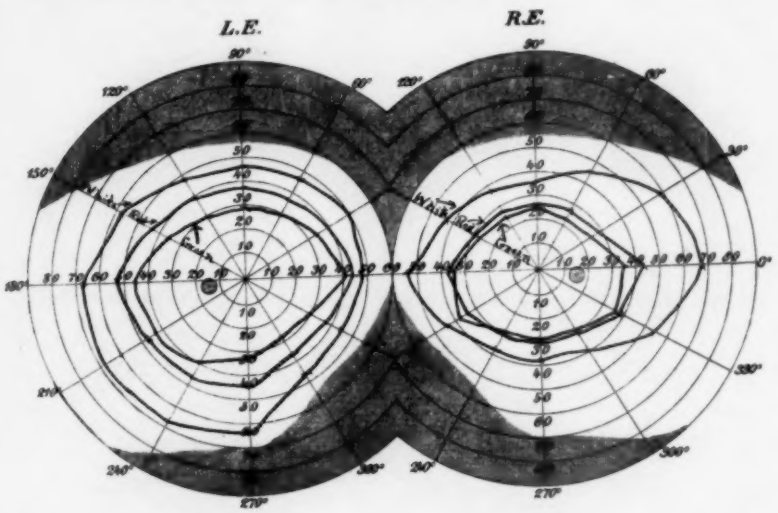

Fig. 2 (P. W.).—Contraction of form and color fields; more pronounced than in figure 1.

TABLE 2.—*Results of Hearing Tests in Case 2, Series 1*

12/9/27	Right	Left	Normal
Conversation	12 feet	9 feet	
Watch	16 inches	6 inches	
256 double vibrations: air	12 seconds	8 seconds	22 seconds
bone	11 seconds	15 seconds	15 seconds
26 double vibrations	Negative	Negative	
64 double vibrations	Negative	Negative	
128 double vibrations	Positive	Positive	
512 double vibrations	Positive	Positive	
1,024 double vibrations	Positive	Positive	
2,048 double vibrations	Positive	Positive	
Weber test	Referred to left		

The blood chemistry showed: urea nitrogen, 16.8 mg. per hundred cubic centimeters (normal from 12 to 15); nonprotein nitrogen, 36.4 mg. per hundred cubic centimeters (normal from 25 to 30); uric acid, 4.2 mg. per hundred cubic centimeters (normal from 1 to 3); calcium, 7 mg. per hundred cubic centimeters (normal from 8 to 10) and chlorides, 710 mg. per hundred cubic centimeters (normal 650).

The examination of the eye showed the following: The vision was 20/15 in the right eye and 20/15 in the left eye; the fundi were normal; the pupillary reactions were normal; the visual fields were contracted to a slight degree in both eyes, but the right eye showed more contraction than the left. The contrac-

tion of the field can be explained by a degeneration of perimaculopapular fibers caused by obscure retrobulbar neuritis.

The results of the hearing tests are shown in table 2.

CASE 3.—Miss R. D., aged 45, without an occupation, began to complain of buzzing in her left ear and some difficulty in hearing about Oct. 1, 1925. Her father was slightly deaf for ten years prior to his death. The maternal grandmother had had asthma and the maternal aunt and a number of cousins had asthma. In March, 1923, the patient had an attack of itching and swelling of the

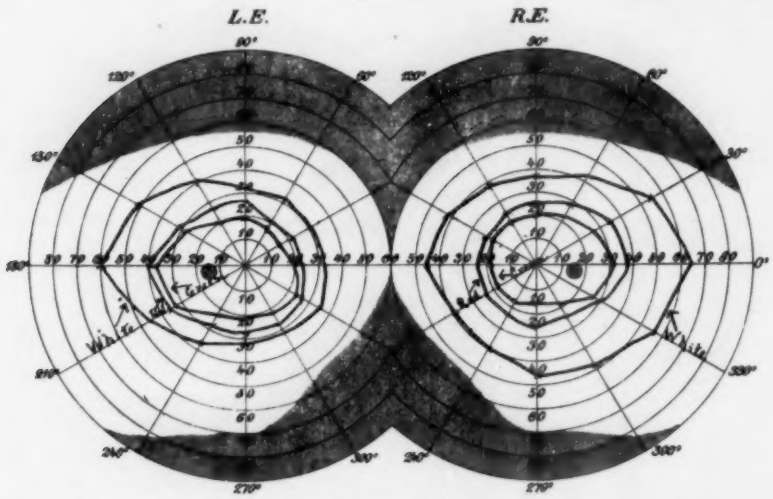

Fig. 3 (R. D.).—Form and color fields universally contracted.

TABLE 3.—*Results of Hearing Tests in Case 3, Series 1*

5/31/27	Right	Left	Normal
Conversation	18 feet	20 feet	
Watch	8 inches	18 inches	
Rinne	Negative	Positive	
256 double vibrations: air	13 seconds	15 seconds	22 seconds
bone	15 seconds	14 seconds	15 seconds
26 double vibrations	Negative	Negative	
36 double vibrations	Positive	Positive	
48 double vibrations	Positive	Positive	
64 double vibrations	Positive	Positive	
128 double vibrations	Positive	Positive	
512 double vibrations	Positive	Positive	
1,024 double vibrations	Positive	Positive	
2,048 double vibrations	Positive	Positive	
Weber test	Referred to left		

entire body, which lasted for ten days. In December, 1926, she had another attack of itching of the body which lasted for a few hours. Buzzing in the ears recurred during this attack. On July 18, 1927, she had another attack of itching all over the body, accompanied by abdominal distress and vomiting which lasted for one week. Directly following this, the buzzing in the ears and difficulty in hearing became much worse. Her left drum was retracted, and the luster was absent. The right drum had a normal appearance. The nasal septum was markedly deviated to the left, and this was corrected by means of a submucous resection in May, 1927.

The results of the hearing tests are shown in table 3.

On Aug. 1, 1927, the blood chemistry showed: urea nitrogen, 12.5 mg. per hundred cubic centimeters (normal from 12 to 15); nonprotein nitrogen, 27.1 mg. per hundred cubic centimeters (normal from 25 to 30); uric acid, 3.2 mg. per hundred cubic centimeters (normal from 1 to 3); calcium, 12.4 mg. per hundred cubic centimeters (normal from 8 to 10) and chlorides, 760 mg. per hundred cubic centimeters (normal 650).

An examination of the eye on Dec. 9, 1927, showed that the vision was 20/30 in the right eye and 20/200 in the left eye; with correction, 20/25 in the right

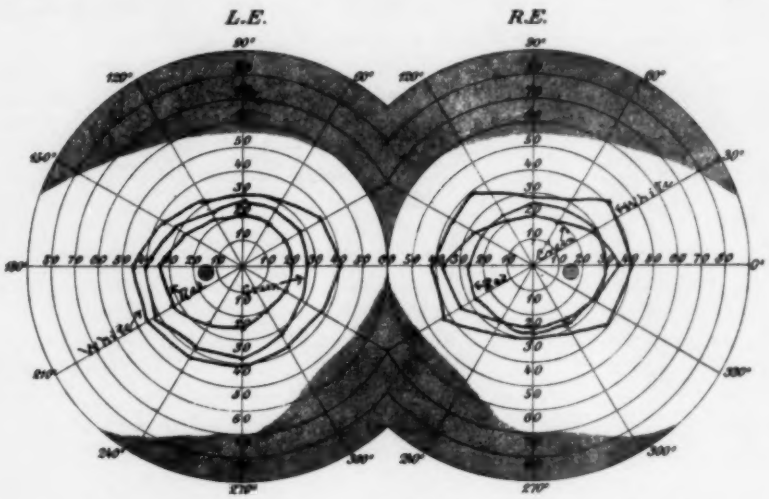

Fig. 4 (G. R.).—Form and color fields universally contracted.

TABLE 4.—*Results of Hearing Tests in Case 4, Series 1*

	Right	Left	Normal
Conversation	At concha	10 inches	
Watch	Negative	Negative	
256 double vibrations: air	Negative	Negative	22 seconds
bone	18 seconds	15 seconds	15 seconds
26 double vibrations	Negative	Negative	
128 double vibrations	Negative	Negative	
512 double vibrations	Negative	Negative	
1,024 double vibrations	Positive	Positive	
2,048 double vibrations	Negative	Negative	
Weber test	Not referred		

eye and 20/100 in the left eye; slight myopia in the right eye and slight myopic astigmatism in the left eye. The fundi were normal in the right eye. There was a hyperemic disk in the left eye. The pupillary reactions were normal. The fields were universally contracted. A definite cause could not be found for the contraction of the fields. There is a possibility for there having been an obscure retrobulbar neuritis, secondary to focal infection.

CASE 4.—Miss G. R., aged 36, without occupation, was examined on Dec. 13, 1927. Bilateral deafness had been present for thirteen years. The patient had attacks of dizziness when she attended school; these became more pronounced

three years previous to examination; she felt as if she would fall forward. Tinnitus had been a symptom since the onset and had continued up to date. When she ate two or three pieces of chocolate candy, she became dizzy; this happened also after ingesting an egg. During the past twelve years, she had had attacks of abdominal pain at varying intervals. For the past four weeks, she had been belching. When she belched, air would go into the right ear. She was habitually constipated. She said she had hemorrhoids. Up to five years previous to admission, she had had asthma for a period of nine years. The tonsils were

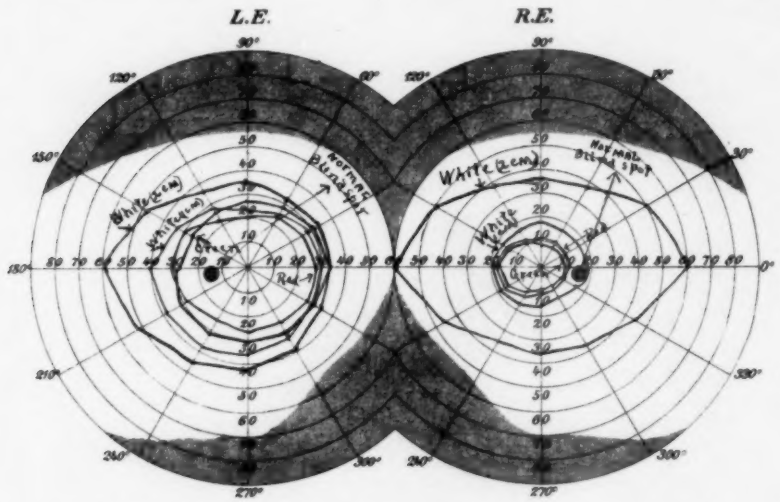

Fig. 5 (K. K.).—Form and color fields markedly contracted.

TABLE 5.—*Results of Hearing Tests in Case 5, Series 1*

	Right		Left	Normal
Conversation	8½ feet		2 feet	
Watch	3 inches		1 inch	
256 double vibrations: air	15 seconds		8 seconds	22 seconds
bone	18 seconds		14 seconds	15 seconds
26 double vibrations	Negative		Negative	
64 double vibrations	Negative		Negative	
128 double vibrations	Positive	>	Positive	
512 double vibrations	Positive	>	Positive	
1,024 double vibrations	Positive	>	Positive	
2,048 double vibrations	Positive	>	Positive	
Weber test	Referred to right			

removed twelve years ago. She had had some form of nasal operation two years previous to the present examination.

There was a history of asthma and hay-fever throughout the family, but no one was deaf, with the exception of the patient.

The tympanic membranes appeared to be normal. A red area could be seen in both drums in the region of the promontory. The eustachian tubes were patent. The urine showed a faint trace of albumin and an occasional hyaline cast. The Wassermann reaction was negative.

The blood chemistry showed: urea nitrogen, 17.4 mg. per hundred cubic centimeters (normal from 12 to 15); nonprotein nitrogen, 38.2 mg. per hundred

cubic centimeters (normal from 25 to 30); creatinine, 1.3 mg. per hundred cubic centimeters (normal from 1 to 2.5); uric acid, 4.6 mg. per hundred cubic centimeters (normal from 1 to 3) and calcium, 9.0 mg. per hundred cubic centimeters (normal from 8 to 10).

The results of the hearing tests are given in table 4.

The eye examination revealed the following: the vision on both sides with correction was 20/20; the refraction was hypermetropia; the pupillary reactions were normal and the visual fields were contracted. The contraction was probably due to a degeneration of the nerve fibers immediately surrounding the maculopapular bundle.

CASE 5.—Mrs. K. K., aged 47, housewife, was examined on Dec. 10, 1927. The patient had had difficulty in hearing with both ears for one year. She said she had had tinnitus at the beginning of the trouble. The defect in hearing came on slowly. For the past four years, she had had swollen, distorted joints of the hands. This was accompanied by limitation of motion.

The right tympanic membrane was apparently normal; the left was retracted. The eustachian tubes were patent. The tonsils had been removed. She had typical aniso-arthritis of an advanced form.

The Wassermann reaction was negative. The urine had a specific gravity of 1.010; there was a faint trace of albumin and an occasional hyaline cast.

The blood chemistry showed: uric acid, 5.1 mg. per hundred cubic centimeters (normal from 1 to 3) and calcium, 7.5 mg. per hundred cubic centimeters (normal from 8 to 10).

In table 5 are shown the results of the hearing tests.

Examination of the eyes showed that the vision on both sides with correction was 20/20; the fundi were normal and the visual fields were contracted on both sides.

REPORT OF CASES OF OTHER TYPES OF DEAFNESS

CASE 1.—Mrs. G. C., aged 38, housewife, was examined on Jan. 11, 1928. For the past five years the patient had gradually become hard of hearing in both ears; buzzing was present from the onset. She had had vertigo for the past month. At times she felt as though she would fall forward. Pain was not present. The tonsils were removed one year previous to the examination. There was no incidence of the onset of deafness with pregnancy or childbirth. For the past two weeks she had a pricking sensation with stiffness and numbness of the ends of all the fingers. There had been a feeling of dryness in the throat for the past five weeks. Acute inflammation of the right ear had been present two years before the present examination. The bowel movements were regular.

The right ear drum was retracted, thickened and scarred; the left was dull and retracted. The right eustachian tube was patent; the left was stenosed. There was a mucopurulent discharge in the right nasal chamber. Both maxillary sinuses were cloudy to transillumination, but on irrigation the fluid returned clear. The Wassermann reaction was negative.

The blood chemistry showed: calcium, 10 mg. per hundred cubic centimeters (normal from 8 to 10) and uric acid, 1.9 mg. per hundred cubic centimeters (normal from 1 to 3).

The results of the hearing tests are shown in table 6.

The eye examination showed the following: the vision was 20/100 in the right eye and 20/100 in the left eye; the fundi were normal and the visual fields were normal.

The diagnosis was bilateral chronic adhesive otitis media.

CASE 2.—Mr. L. G., aged 41, in the advertising business, was examined on Jan. 6, 1928. Ringing in the right ear had been present for one day, with some dulling of the hearing on that side. There had been pain in the left shoulder and arm for the past two weeks. Psoriasis had been present for years.

Examination showed that the Shrapnell's membrane of the right ear was congested. The left ear drum was normal.

The right eustachian tube was moderately obstructed and the left was patent. Tinnitus in the right ear did not disappear after successful inflation.

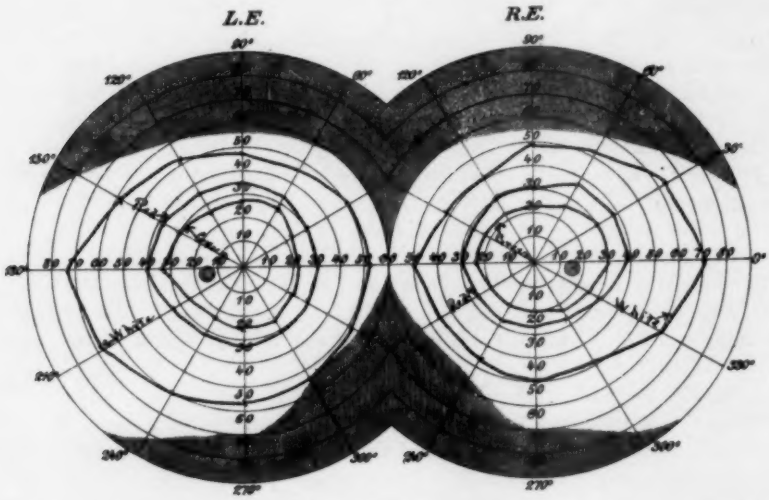

Fig. 6 (G. C.).—Bilateral chronic adhesive otitis media; form and color fields normal.

TABLE 6.—*Results of Hearing Tests in Case 1, Series 2*

	Right	Left	Normal
Conversation	1½ feet	10 inches	
Watch	Negative	At concha	
256 double vibrations: air	7 seconds	6 seconds	22 seconds
bone	12 seconds	12 seconds	15 seconds
26 double vibrations	Negative	Negative	
64 double vibrations	Negative	Negative	
128 double vibrations	Negative	Negative	
2,048 double vibrations	9 seconds	10 seconds	30 seconds
15,000 double vibrations	Positive	Positive	
20,000 double vibrations	Negative	Positive	
Weber test	Referred to right		
Hearing improved after inflation			

There was polypoid degeneration of the mucous membranes of the inferior turbinates in their posterior portions; the posterior tips were enlarged.

The urine showed a faint trace of albumin and an occasional hyaline cast. The Wassermann reaction was negative. The blood pressure was diastolic 96 and systolic 119.

The blood chemistry showed: sugar, 108 mg. per hundred cubic centimeters (normal from 60 to 120); urea nitrogen, 18.8 mg. per hundred cubic centimeters (normal from 12 to 15); nonprotein nitrogen, 34.1 mg. per hundred cubic centimeters (normal from 25 to 30); uric acid, 3.7 mg. per hundred cubic centimeters

(normal from 1 to 3); chlorides, 412 mg. per hundred cubic centimeters (normal 650) and calcium, 9 mg. per hundred cubic centimeters (normal from 8 to 10).

The results of the hearing tests are shown in table 7.

Examination of the eyes showed that the vision was 20/20 in the right eye and 20/30 in the left eye and the fundi were normal. The visual fields were normal except the field for green was somewhat contracted, but it was probably of no pathologic significance.

The diagnosis in this case is open to question. My opinion is that there was a minute hemorrhage into the cochlear nerve of the right side.

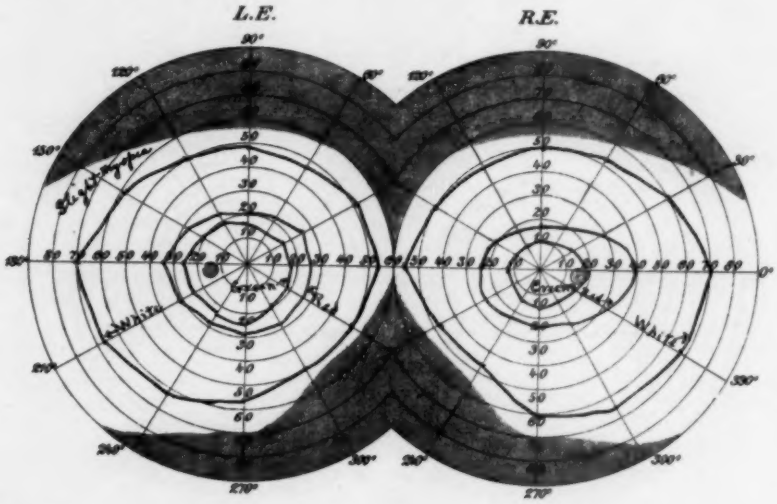

Fig. 7 (L. G.).—Hemorrhage into cochlear nerve; slight contraction for red and green in the right eye.

TABLE 7.—*Results of Hearing Tests in Case 2, Series 2*

	Right	Left	Normal
Conversation	40 feet	40 feet	
Watch	2 feet	Over 3 feet	
256 double vibrations: air	18 seconds	18 seconds	22 seconds
bone	12 seconds	17 seconds	15 seconds
26 double vibrations	Positive	Positive	
64 double vibrations	Positive	Positive	
128 double vibrations	27 seconds	39 seconds	30 seconds
512 double vibrations	58 seconds	72 seconds	60 seconds
1,024 double vibrations	24 seconds	32 seconds	50 seconds
2,048 double vibrations	17 seconds	23 seconds	30 seconds
10,000 double vibrations	Positive	Positive	
15,000 double vibrations	Positive	Positive	
20,000 double vibrations	Positive	Positive	
Weber test	Not referred		

CASE 3.—Mr. A. S., aged 64, export broker, was examined on Dec. 27, 1927. The patient had had difficulty in hearing for the past seven years. The left ear was worse than the right. The condition began with buzzing and vertigo; the latter still persisted. He had marked deviation of the septum, which was corrected five years previous to the present examination. There was a history of hay-fever, asthma and eczema in the family. There was no history of deafness.

The right ear drum was thickened, dull and retracted. The left drum was retracted; there was congestion around the hammer handle.

The blood chemistry showed: uric acid, 2.8 mg. per hundred cubic centimeters (normal from 1 to 3) and calcium, 12 mg. per hundred cubic centimeters (normal from 8 to 10).

The results of the hearing tests are shown in table 8.

The vision was 20/20 in the right eye and 5/200 in the left eye; the fundi were normal; the visual field was normal in the right eye and contracted in the left. This was due to a marked amblyopia caused by a high refraction error.

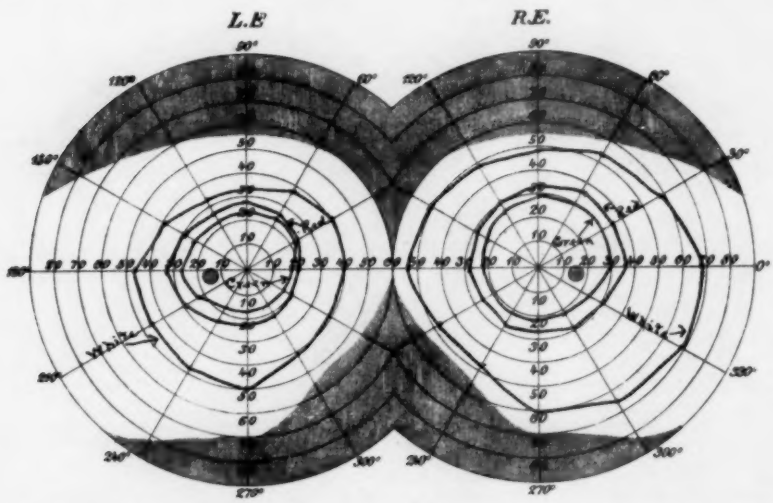

Fig. 8 (A. S.).—Bilateral chronic catarrhal otitis media; contraction of fields of left eye due to marked amblyopia.

TABLE 8.—*Results of Hearing Tests in Case 3, Series 2*

	Right		Left	Normal
Conversation	20 feet		5½ feet	
Watch	1½ inches		½ inch	
256 double vibrations: air	17 seconds		7 seconds	22 seconds
bone	15 seconds		9 seconds	15 seconds
26 double vibrations	Positive		Negative	
128 double vibrations	Positive	>	Positive	
512 double vibrations	Positive	>	Positive	
1,024 double vibrations	Positive	>	Positive	
2,048 double vibrations	Positive	>	Positive	
Weber test	Not referred			
Hearing improved after inflation				

The diagnosis was bilateral chronic catarrhal otitis media. The high calcium in the blood was probably a coincidence.

CASE 4.—Miss S. Y., aged 23, a cook, was examined on Jan. 9, 1928. The patient had had a discharge from the right ear when she was a child. This recurred following a cold in the head three years previous to the present examination. In August, 1927, she developed tinnitus and a reduction in her hearing. After a few treatments, which included inflation, the hearing improved and the

tinnitus disappeared. She had had occasional attacks of vertigo. There was no history of deafness in the family.

The upper anterior portion of Shrapnell's membrane of the right ear was defective, and the cavity contained a foul-smelling gray discharge. The remainder of the drum was retracted and scarred. The left ear drum was retracted and scarred. The eustachian tubes were patent. The Wassermann reaction was negative.

The blood chemistry showed: uric acid, 2.1 mg. per hundred cubic centimeters (normal from 1 to 3) and calcium, 7.9 mg. per hundred cubic centimeters (normal from 8 to 10).

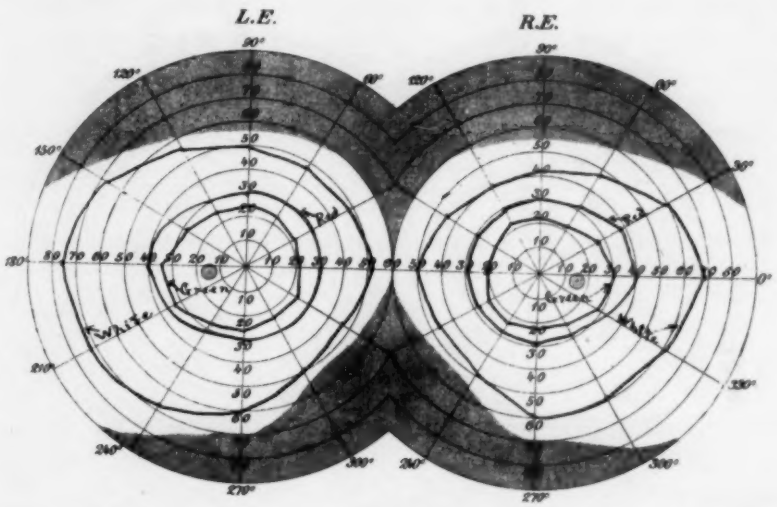

Fig. 9 (S. Y.).—Chronic adhesive otitis media on the left side; attic suppuration on the right side; form and color fields normal.

TABLE 9.—*Results of Hearing Tests in Case 4, Series 2*

	Right	Left	Normal
Conversation	12 feet	20 feet	
Watch	1 inch	3 inches.	
256 double vibrations: air	10 seconds	13 seconds	22 seconds
bone	13 seconds	10 seconds	15 seconds
26 double vibrations	Negative	Positive	
128 double vibrations	Negative	Positive	30 seconds
512 double vibrations	Faintly heard	Faintly heard	60 seconds
1,024 double vibrations	Positive	Positive	50 seconds
2,048 double vibrations	20 seconds	12 seconds	30 seconds
15,000 double vibrations	Positive	Positive	
20,000 double vibrations	Negative	Positive	
Weber test	Referred to right		

The results of the hearing tests are given in table 9.

An examination of the eye showed that vision, fundi, media and visual field were normal.

The diagnosis was attic suppuration on the right side and chronic adhesive otitis media on the left.

CASE 5.—Mr. H. B., aged 21, a clerk, was examined on Sept. 16, 1924. Deafness in the left ear had been present for two years. The patient had never had

attacks of dizziness, tinnitus or headaches. Six or seven months before the onset, the patient had an abscess in the same ear. He said that one sister had been deaf, but was well.

Both drums were retracted, and the eustachian tubes were obstructed.

The patient had been treated for a period of more than three years. During this time, the eustachian tubes had been dilated so that now it was easy to inflate both ears. During the spring of 1927, he developed an obstruction of the orifice of the right eustachian tube. This was found to be due to polypoid masses that had developed in the orifice. These were gradually curretted away.

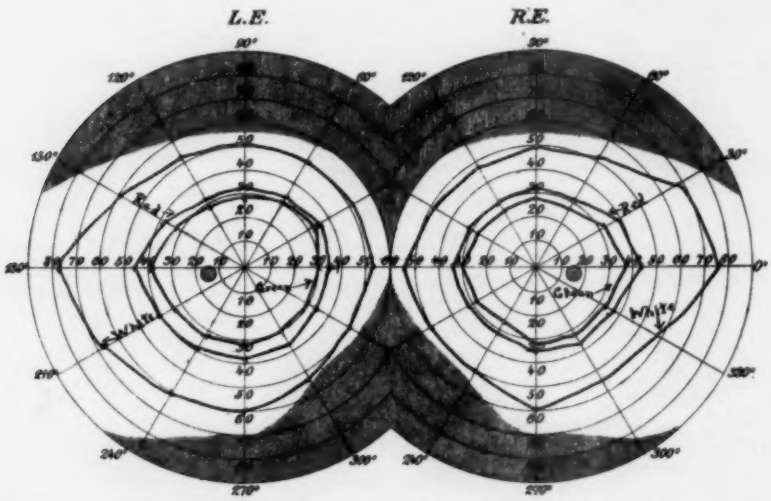

Fig. 10 (H. B.).—Bilateral nerve deafness associated with tubal obstruction; form and color fields normal.

TABLE 10.—*Comparison of Results of Hearing Tests in Case 5, Series 2*

9/16/24	Right	Left	2/13/28	Right	Left
Conversation	40 feet	2 feet	Conversation	40 feet	6 inches
Watch	3 inches	At ear	Watch	3 inches	Not heard
256 double vibrations			256 double vibrations		
Air	11 seconds	5 seconds	Air	22 seconds	Not heard
Bone	13 seconds	14 seconds	Bone	17 seconds	16 seconds
26 double vibrations	Negative	Negative	26 double vibrations	Negative	Negative
48 double vibrations	Positive	Negative	128 double vibrations	Negative	Negative
64 double vibrations	Positive	Negative	512 double vibrations	60 seconds	25 seconds
128 double vibrations	Positive	Negative	1,024 double vibrations	30 seconds	10 seconds
2,048 double vibrations	17 seconds	Negative	2,048 double vibrations	15 seconds	Negative
Weber test	Refrrred to left		Weber test	Not referred	
			Hearing not improved after inflation		

The Wassermann reaction was negative and the urine was normal.

The blood chemistry showed: calcium, 9 mg. per hundred cubic centimeters (normal from 8 to 10) and uric acid, 3.9 mg. per hundred cubic centimeters (normal from 1 to 3).

The results of the hearing tests on Sept. 16, 1924, and those of Feb. 13, 1928, are recorded for comparison in table 10.

On examination of the eye the vision, fundi and visual fields were found to be normal.

In this case the condition has become slowly and progressively worse since September, 1924. There has been an improvement in the perception to the 256 double vibrations fork as compared to the result of the examination in 1924. The figures for bone are now even better than the normal values. The Rinne reaction is positive on the right side now, whereas formerly it was decidedly negative. The patient is suffering from some form of nerve deafness. The history of acute infection, obstruction of the eustachian tubes and the high uric acid content of the blood must be given due consideration.

COMMENT

Drury [1] reports two cases that were exhaustively studied. Included in his observations were the visual fields. In one, he found contraction of the fields for form and color and an evidence of a previous inflammatory condition of the nerve heads; in the other, contracted form and color fields, enlarged blind spots and changes in the disk suggestive of previous inflammatory changes were present.

In an earlier portion of his article, Dr. Drury says: "In a study of the connection of otosclerosis with disturbed function of the endocrine system covering a period of two years and involving careful observation and study of a series of over one hundred cases, etc." From this it is fair to presume that the two cases he reported in the paper in question were the only ones in which the visual fields were taken. For if such an examination had been undertaken on others, he would have been impressed with its presence even though it did not occur with the regularity as is found here.

It is possible that contraction of visual fields does not occur in all cases of progressive deafness. If it is encountered in a fair portion of cases, it may have a value in classifying into subgroups cases that come within the category of progressive deafness. This, in turn, may help one to evolve a more comprehensive conception of its pathologic physiology.

23 West Seventy-Third Street.

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1. Drury, D. W.: Otosclerosis, Ann. Otol. Rhin. & Laryng. **35**:651 (Sept.) 1926.

TRACHEOBRONCHIAL TREE IN CHILDREN

WITH REFERENCE TO BLOOD ASPIRATED DURING TONSILLECTOMY AND ADENOIDECTOMY UNDER ETHER ANESTHESIA *

HARRIS H. VAIL, M.D.
CINCINNATI

In 1922, Myerson [1] studied the tracheobronchial tree and its contents immediately after tonsillectomy under general anesthesia in a series of one hundred cases. When the bleeding was entirely controlled and the pharynx was dry, a direct laryngoscopy and tracheobronchoscopy was performed. In all but three cases the operation was performed with the patient's head placed on the end of a table which was dropped to an angle of 45 degrees. Suction was used in all cases. In his series of one hundred cases, he found that seventy-nine patients has aspirated blood and pharyngeal contents in varying amounts into the tracheobronchial tree, and one patient who showed blood in the trachae and each bronchus at operation died six days later of bronchopneumonia.

In 1924, Myerson [2] repeated the examination in another series of one hundred cases. In this series, he was investigating chiefly whether cough did protect the tracheobronchial tree from the aspiration of blood and mucus during operations on the tonsils and adenoids under ether. In this series of one hundred cases, seventy-six patients showed blood in varying quantity in the tracheobronchial tree.

In 1927, Louis Daily and Ray K. Daily [3] performed bronchoscopies in a series of one hundred cases after operations on the tonsils and adenoids under general anesthesia, and in this series seventy-eight patients had blood in the tracheobronchial tree.

This work was also undertaken at the Cincinnati General Hospital at the direction of Dr. Samuel Iglauer, and was completed through the cooperation of Drs. Edward King, Henry Goodyear, Samuel Seltz and Paul Smith. Bronchoscopy was performed in one hundred cases following operations on the tonsils and adenoids under ether anesthesia. The age of the children varied from 3 to 14 years. A chart was kept con-

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* From the Department of Laryngology, Dr. Samuel Iglauer, Director, Cincinnati General Hospital.

* Read at the meeting of the Cincinnati Oto-Laryngologic Society, March 13, 1928.

1. Myerson, M. C.: Pulmonary Aspects of Tonsillectomy Under General Anesthesia, Laryngoscope **32**:929 (Dec.) 1922.

2. Myerson: Bronchoscopic Observations on Cough Reflex in Tonsillectomies Under General Anesthesia, Laryngoscope **34**:63 (Jan.) 1924.

3. Daily, Louis; and Daily, Ray K.: Bronchoscopic and Esophagoscopic Observations in Tonsillectomies, Texas State J. Med. **23**:277 (Aug.) 1927.

taining the essential data, like the one Myerson had kept in his work. The open cone method was used for the induction of ether, and when the patient was on the operating table, ether was continued by a motor-driven apparatus. Suction was used whenever indicated. Ninety-two of the operations were performed with the patient prone; six were performed with the patient in the Trendelenburg position and two with the patient lying on the side. The presence or absence of the laryngeal reflex was noted; this reflex was present in forty-four of the cases. The amount of bleeding at the time of the operation was recorded, as was also the color of the patient and the type of respiration.

To sum up the results in this series of one hundred patients: Sixty-two showed blood in the larynx and trachea in varying amounts; thirty-nine showed blood in varying amounts in the right bronchus, and thirty-one in varying amounts in the left bronchus. The two patients who were operated on lying on the side showed considerable blood in the larynx, trachea and bronchi. Of the six patients operated on in the Trendelenburg position, two showed blood in the trachea with none in the bronchi and one showed blood in the trachea and bronchi. Five of the patients operated on in the prone position were cyanotic during the operation, and four of these showed blood in the trachea and bronchi. Only two patients vomited during the operation. Neither of these showed any blood in the trachea or bronchi.

In the majority of cases in which a bloodless operation was performed, blood was not found in the trachea or bronchi.

The majority of patients in whom the laryngeal reflex was present did not have any blood or had only a slight amount in the tracheobronchial tree.

One patient in whom the laryngeal reflex was present had considerable blood in the tracheobronchial tree.

The majority of patients who bled profusely at the time of the operation had blood in the tracheobronchial tree.

During this study every effort was made to control bleeding from the tonsillar fossa before bronchoscopy was performed. Some of the patients came to bronchoscopy with sponges in the tonsillar fossae or nasopharynx. This may explain the lower percentages in this series as compared with Myerson's first series, for Myerson stated that sponges were not applied in the tonsillar fossae except when there was frank bleeding.

SUMMARY

In his first series of one hundred cases in which bronchoscopy was performed after operations on the tonsils and adenoids, Myerson found that seventy-nine patients had aspirated blood into the tracheobronchial tree. In his second series of one hundred cases, he found that seventy-six patients had aspirated blood. Louis Daily and Ray K. Daily, in one

hundred cases, found that seventy-eight patients aspirated blood. In a series of one hundred cases at the Cincinnati General Hospital sixty-two patients aspirated blood. Though the figures in this institution are slightly lower than those of the other observers, they are sufficiently high to make one think about the importance of overcoming the aspiration of blood into the tracheobronchial tree during operations on the tonsils and adenoids under ether anesthesia.

Myerson followed up the cases in his first series; one patient died of bronchial pneumonia. It has been impossible to follow up the patients from the Cincinnati General Hospital well enough to make any definite report about the sequelae of operation.

LIGATION OF THE EXTERNAL CAROTID ARTERY FOR PERSISTENT NASAL HEMORRHAGE*

BENJAMIN H. ABRAHAMS, M.D.
BROOKLYN

Not many instances of ligation of the external carotid artery for severe nasal hemorrhage are given in the literature. Hyde [1] reported a case of what he terms idiopathic nasal hemorrhage which was ultimately controlled by ligation of the external carotid artery. This appears to be the only case in which the external carotid artery was tied for essential nasal hemorrhage. There are, however, many reports of the ligation of the common carotid artery. Bartlett and McKittrick [2] presented a paper on a case of secondary hemorrhage in which the common carotid artery was ligated. A review of their references shows that many cases of hemorrhage from the nose and throat, either spontaneous or postoperative, could have been controlled by a less formidable procedure than ligation of the common carotid artery; namely, by ligation of the external carotid artery. Spontaneous hemorrhage from inoperable malignant conditions of the jaw, antrum and orbit; hemorrhagic ulceration of the tonsil; angioma of the face, and epithelioma of the tongue are sufficient indication for ligating the external carotid artery. The external carotid artery is tied off for the preoperative control of bleeding as in the removal of a nasopharyngeal fibroma, malignant conditions of the jaw, orbit and tonsil, and in surgical procedures on the tongue. The operative mortality in ligation of the common carotid artery is given as from 2 to 3 per cent, whereas in ligation of the external carotid artery, it is nil. Marked edema of the soft palate and lateral pharyngeal wall and a slight edema of the larynx are sometimes seen. These conditions pass away within a few hours following ligation of the external carotid artery.

An intimate knowledge concerning the blood supply of the nose is valuable in order that one may be able to cope with serious hemorrhage which may at times prove fatal. Blood comes to the superior part of the nose from the anterior and posterior ethmoidal branches of the ophthalmic artery, which is a branch of the internal carotid artery. The blood comes to the posterior and lateral walls of the nasal fossae and to the septum from the sphenopalatine artery, which is a direct continuation of the internal maxillary artery, one of the terminal branches of the

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* From the Department of Laryngology, Kings County Hospital; service of Dr. H. Arrowsmith.

1. Hyde, S. T.: Ligating the External Carotid Artery. Eye, Ear, Nose & Throat Month. **5**:406 (Aug.) 1926.

2. Bartlett and McKittrick: Ann. Surg. **65**:715, 1917.

external carotid artery. Inferiorly and anteriorly, the blood supply is from the facial artery, also a branch of the external carotid, and from the ascending pharyngeal and palatine arteries, which are terminal branches of the external carotid artery. It is thus seen that all the blood supply of the nose, with the exception of that which comes from the ethmoidal arteries, is from the external carotid artery. The sphenopalatine artery enters the nasal cavity through the sphenopalatine foramen and passes beneath the mucosa on the anterior wall and occasionally along the anterior part of the floor of the sphenoidal sinus. As such, it is liable to injury which can produce severe bleeding. In operating on the sphenoid, the mucosa is peeled off the anterior surface of the sinus and crushed with a clamp. This will include the sphenopalatine artery as it lies in the mucosa, thus affording a means of preventing hemorrhage. This technic was originally advocated by Yankauer.[3] Tight packing of the posterolateral area of the nose may control such bleeding. In this case conservative measures to control the bleeding and one transfusion were of no avail. The low percentage of hemoglobin and the low red blood cell count, together with the repeated recurrences, were the determining factors in tying off the external carotid artery.

TECHNIC OF LIGATION OF EXTERNAL CAROTID ARTERY

An incision about 3 inches (7.6 cm.) long is made along the anterior border of the sternomastoid muscle, the middle of which is opposite the upper border of the thyroid cartilage. This will enable one to tie the artery near its origin below the point where it is crossed by the digastric muscle. After exposure of the bifurcation of the common carotid artery, the external carotid will be seen to lie medial and somewhat anterior to the internal carotid artery. The ligature is applied between the origin of the superior thyroid and lingual branches. After ligation, the circulation is slowly reestablished by the free communications between most of the branches of the artery and the branches of its fellow of the other side. Ligation of one external carotid artery arrests the circulation for only a brief period, and within a few days the circulation is completely reestablished. A great number of small vessels in the midline join the external carotid of one side to that of the other. Ligation of both external carotid arteries produces only temporary anemia. Dawbarn [4] points out that even after excision of the external carotid artery, with separate ligature of its eight branches, blood can still reach the nose, tongue and other structures from other sources.

REPORT OF CASE

A man, aged 31, was admitted to the hospital on Nov. 6, 1926; he was discharged on Dec. 22, 1926. On the morning of admission, he had been operated on for right ethmoid and sphenoid disease at another hospital. About three hours

3. Yankauer, S.: Operative Demonstration, Ear, Nose and Throat Section, Kings County Medical Society, 1925; The Complete Spheno-ethmoid Operation, Laryngoscope **31**:831, 1921.

4. Dawbarn, in Gray: Textbook of Anatomy, Anatomy of the External Carotid Artery, Philadelphia, Lea & Febiger, 1910, p. 592.

after the operation, his nose began to bleed severely, and he was brought to the Kings County Hospital. On admission, a packing was placed anteriorly and posteriorly, which controlled the hemorrhage. He was given calcium lactate and morphine sulphate, and hemostatic serum was given intravenously. The coagulation time was four minutes; the bleeding time, three minutes. Forty-eight hours later, the patient was taken to the operating room because of recurrent bleeding. At this time, the nose was repacked with gauze moistened with hemostatic serum.

On the following day, the third day after the operation, it became necessary to repack the nose to control the bleeding. The patient became hysterical during the next night and pulled the packing out. This caused a severe hemorrhage, which was finally controlled. The blood count on this day showed: red blood cells, 3,500,000 per cubic millimeter; hemoglobin, 60 per cent. A transfusion of 500 cc. of citrated blood was therefore given.

On the fifth day, the patient felt stronger; his general condition was good. The next day his condition remained good. There were 3,616,000 red blood cells per cubic millimeter and hemoglobin 72 per cent. The pulse rate was 74 a minute. On the eighth day, or four days after the transfusion, there was sudden profuse bleeding from the nose; it was decided that a ligation of the external carotid artery on the right side should be performed. Several hours after this procedure, a second transfusion of 500 cc. of blood was given. Bleeding did not recur at any time subsequent to the ligation. On the second postoperative day, a slight infection of the wound in the neck was noted. The next day all the sutures were removed from this wound and the wound permitted to drain. There were 3,040,000 red blood cells and 65 per cent of hemoglobin. On the fifth postoperative day, a profuse purulent discharge was seen to come from the left ear. The right tympanic membrane was bulging and diffusely red. No details were visible; therefore, a percentesis was performed. Subsequently the infection in the wound cleared, and both ears became dry.

On Dec. 22, 1926, the patient was discharged in good condition after having been in the hospital forty-six days. At this time, the red blood cell count was 3,700,000; the hemoglobin content was 70 per cent.

The patient developed an ulcerative wound of the right leg as a result of a burn which did not seem to heal. Repeated Wassermann tests were negative. About two or three months after he left the hospital, a positive Wassermann reaction of the blood was obtained. Mention is made of this fact because it is thought that the sphenopalatine vessel might have been involved in a syphilitic process, which prevented its retraction, and a thrombus formation after the usual means of controlling hemorrhage.

SUMMARY

A case is reported in which the patient suffered from severe nasal hemorrhage following an operation on the ethmoid and sphenoid sinuses. The usual means of controlling hemorrhage, including transfusion, were of no avail. Ligation of the external carotid artery was performed because of the persistent recurrent bleeding. This procedure proved effective.

RADICAL OPERATION ON THE MASTOID

END-RESULTS IN ONE HUNDRED UNSELECTED CASES *

LEON E. WHITE, JR., M.D.
BOSTON

Radical operations on the mastoid are largely successful. I grant, however, that not in every case is there a dry cavity, or is entire relief of the symptoms associated with a chronically discharging ear obtained.

A radical operation on the mastoid is successful when it prevents intracranial infection, stops or lessens discharge from the ear and offensive odor, relieves headaches and dizziness and preserves the hearing.

What are the end-results in this average group of cases? What is the effect on the hearing? What effect have the duration of the discharge and previous operations on the end-results? What bearing has a deviated septum, hypertrophied turbinates, tonsils or adenoids on the condition of the ear? How successful are the various types of canal flaps and methods used to epidermitize the cavity? How many of these patients obtained relief from headaches or dizziness? What was the incidence of complications?

RESULTS OF OPERATIONS

Unfortunately, a group of 100 cases is an inadequate number on which to base conclusions, but it will serve to give a fairly accurate idea of what is being done, and will give substantial encouragement in future cases.

All surgeons at times have questioned the success of radical operations on the mastoid. In the great majority of patients seen in the clinic at the Massachusetts Eye and Ear Infirmary on whom this operation has been performed, the ears were discharging copiously.

In fifty-seven cases, the cavities were dry and well epidermitized at the time of observation. This number far exceeded the commonly accepted idea of successful operations. In twenty-two cases the cavities were moist and needed attention. Twenty-one patients had granulations, and the discharge was profuse. It was lessened by the use of solution M (boric acid, 20 grains [1.3 Gm.] and alcohol, 1 ounce [30 cc.]), and the patients were advised to return regularly for local treatment or removal of the granulations. The results of the tests of hearing were indeed discouraging. Only thirty-seven patients had improved in various degrees. This, however, is in accord with Politzer.[1] He referred to the following authors:

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* Read at the meeting of the New England Otolaryngological Society, Jan. 11, 1928.

1. Politzer, Adam: Textbook of Diseases of the Ear, translated and edited by Ballin and Heller, ed. 4, London, Ballière, Tindall & Cox, 1902, p. 572.

Hammerschlag (1895-1897) reported that in the majority of cases the hearing was not influenced by operation. Decided improvement was noted in a small percentage of cases, but more often a change for the worse was seen. Stack's reports showed improved hearing in 31 per cent; decreased in 6 per cent, and unchanged in 63 per cent. Grunert's statistics were: improved, 55 per cent; decreased, 6 per cent, and unchanged, 39 per cent. Grossman maintained that if the labyrinth is intact, the hearing will be improved in 50 per cent of the cases, unchanged

TABLE 1.—*Results of Tests of Hearing in Left Ear of W. M.*

	Admission	After Operation	Present
Whisper	0 feet	0 feet	5 feet
Voice	1 foot	4 feet	17 feet
High limit	0.4 (Galton whistle)	0.5 (Galton whistle)	0.4 (Galton whistle)
Low limit	96 (64 d. v.* fork)	93 (64 d. v. fork)	64 (64 d. v. fork)
Rinne	9/18 (128 d. v. fork)	16/7 (9128 d. v. fork)	40/20 (128 d. v. fork)
Weber	× (96 d. v. fork)	× (96 d. v. fork)	× (96 d. v. fork)

* In this table and in tables 2, 3, 4 and 5 d. v. indicates double vibrations.

TABLE 2.—*Results of Tests of Hearing in Left Ear of M. M.*

	Admission	After Operation	Present
Whisper	1 foot	Not taken	18 feet
Voice	6 feet		18 feet
High limit	0.3 (Galton whistle)		0.3 (Galton whistle)
Low limit	96 (64 d. v. fork)		96 (64 d. v. fork)
Rinne	6/13 (128 d. v. fork)		20/25 (128 d. v. fork)
Weber	× (96 d. v. fork)		× (96 d. v. fork)

TABLE 3.—*Results of Tests of Hearing in Right Ear of E. L.*

	Admission	After Operation	Present
Whisper	0 feet	0 feet	16 feet
Voice	1 foot	0 feet	18 feet
High limit	0.3 (Galton whistle)	0.3 (Galton whistle)	1.3 (Galton whistle)
Low limit	128 (64 d. v. fork)	1024 (64 d. v. fork)	256 (64 d. v. fork)
Rinne	5/25 (128 d. v. fork)	0/249 (128 d. v. fork)	15/23 (128 d. v. fork)
Weber	× (96 d. v. fork)	× (96 d. v. fork)	× (96 d. v. fork)

in 20 per cent and lost in 30 per cent; if the labyrinth is affected, the hearing will be unchanged in 46 per cent; improved in 39 per cent and lost in 15 per cent.

Three cases in this series showed a remarkable improvement, as can be seen in tables 1, 2 and 3. The results of the tests of hearing in the left ear of W. M., operated on three years before admission to the clinic, are shown in table 1.

The results of the tests of hearing in the left ear of M. M., operated on three years before admission to the clinic, are shown in table 2.

The results of tests of hearing in the right ear of E. L., operated on three years before admission to the clinic, are shown in table 3.

It is interesting to note that on these patients a primary skin graft had been made. This substantiates Dr. Philip Hammond's theory. He advocates a radical operation on the mastoid with a primary skin graft to preserve or to improve the hearing.

A 50 per cent gain in hearing was obtained in seven patients. The improvement shown by the other twenty-seven was that the distance at which the voice could be heard was increased from 1 to 3 feet. In fourteen patients, a change in the sense of hearing did not occur.

Poorer hearing following operations resulted in forty-nine cases. Seven patients whose hearing was normal lost it completely. These seven were operated on for the following reasons: recurrent aural polypus, two cases; continuance of discharge after simple mastoid operation, two cases; ossiculectomy which failed to stop the discharge, one case, and exploration for abscess of the brain, one case.

Three patients in the entire series had nerve deafness. The remainder had varying degrees of loss of hearing, but practically all had poor hearing before operation.

Failure occurred in every radical operation when the discharge had lasted for less than a year.

Good results were obtained in one half (fifteen) of the twenty-nine cases in which there had been a discharge for less than five years; in two thirds (fourteen) of the twenty cases in which there had been a discharge for less than ten years; in two thirds (nine) of the thirteen cases in which there had been a discharge for less than fifteen years, and in one half (fourteen) of the twenty-five cases in which there had been a discharge for more than fifteen years.

Tonsillectomy seems to have been beneficial.

Eighty-three patients had had previous operations: seventeen, simple mastoid operation; thirteen, removal of aural polypus; three, submucous resection; forty-six, removal of tonsils and adenoids, and four, ossiculectomy. In fifty-two, or about two thirds, a good cavity followed the radical operation. Twenty-two patients had hypertrophied turbinates, usually the middle; sixteen of these (about two thirds) had good cavities as a result of radical operation.

Roentgen-ray examination is not of prognostic value. Twenty-four of the patients had formation of cavities, with seventeen good results, or about two thirds. Eighteen showed destruction but not an appreciable cavity; thirteen, or about one half, had good results. Thirty-nine showed a sclerosed mastoid; twenty-four, or about two thirds, had a good result.

SKIN GRAFTS

The Korner flap was successful in fifty of the fifty-seven cases in which good cavities followed the radical operation. It was used in eighty-seven of the cases. The Smyth flap was used five times, with

four good results. The Siebenmann flap was used twice, and one case showed a good cavity. In six cases, a canal flap was not made; two of these were successful.

Whatever method was used for epidermitizing the cavity, except that employing the paraffin basket, the end-results were successful in 50 per cent of the cases.

In thirty-two cases a primary skin graft was used, and in about one half, or nineteen, there were good cavities. On twenty-nine patients a secondary skin graft was used. Slightly more than one half (seventeen) had good cavities. The results were successful in 75 per cent of the cases in the small series in which the paraffin basket was used. Of the cavities allowed to epidermitize without the use of a skin graft or a paraffin basket, twenty-seven, or about one half, showed good results.

TABLE 4.—*Results of Tests of Hearing in Right Ear of S. F.*

	Admission	After Operation	Present
Whisper	7 feet	Not taken	0 feet
Voice	17 feet		0 feet
High limit	0.4 (Galton whistle)		512 (d. v. fork)
Low limit	96 (64 d. v. fork)		512 (64 d. v. fork)
Rinne	25/15 (128 d. v. fork)		12/12 (128 d. v. fork)
Weber	× (96 d. v. fork)		× (96 d. v. fork)

TABLE 5.—*Results of Tests of Hearing in Left Ear of L. H.*

	Admission	After Operation	Present
Whisper	0 feet	Not taken	3 feet
Voice	0 feet		9 feet
High limit	0.15 (Galton whistle)		2048 (d. v. fork)
Low limit	64 (64 d. v. fork)		96 (64 d. v. fork)
Rinne	10/50 (128 d. v. fork)		12/20 (128 d. v. fork)
Weber	× (96 d. v. fork)		× (96 d. v. fork)

The average stay in the infirmary was from four to five weeks; 9 per cent of the patients stayed three weeks; 28 per cent, four weeks; 37 per cent, five weeks, and 26 per cent, more than six weeks.

In the majority of cases, headache and dizziness were relieved. Forty-five patients had headaches, thirty-eight were relieved and seven were not relieved. Fifty-five patients had dizziness; thirty-nine were relieved and sixteen were not relieved.

Complications were few. Two patients had a serous labyrinthitis. In one of these S. F., the results of the tests of hearing in the right ear are shown in table 4.

Table 5 shows the results of the tests of hearing in the left ear of the other patient, L. H.

Only three of one hundred patients had facial paralysis, and only one case occurred postoperatively. All these patients recovered. One exploration was performed for abscess of the brain; there were two

cases of erysipelas, two of sinus thrombosis, one of meningitis which was considered secondary to abscess of the brain and in which the spinal fluid was sterile, one of fistula of the horizontal canal and one of surgical shock.

SUMMARY AND CONCLUSIONS

1. Fifty-seven of the radical operations were completely successful, and the rest resulted in a decided lessening of discharge and odor. Only three patients in the entire series had intracranial complications: one had meningitis and two, serous labyrinthitis.

2. Improved hearing occurred in thirty-seven cases; the hearing was unchanged in fourteen and lost in forty-nine.

3. Complete failures occurred in all cases in which a discharge had been present for less than a year. The most favorable results were obtained in cases in which a discharge had been present for less than fifteen years and for more than five years.

4. The choice of methods of skin graft is unimportant. Primary and secondary skin grafts alike resulted in about 50 per cent good cavities; in cases in which skin grafts were not employed, the results were equally successful. The method employing the paraffin basket was the most successful, with good results in three fourths of the cases.

5. The period of hospitalization averaged from four to five weeks.

6. Hypertrophy of the turbinates had little bearing on the end-results. Tonsillectomy was beneficial.

7. Thirty-eight of the forty-five patients who suffered from headaches were relieved, and thirty-nine of the fifty-five who were subject to dizziness were relieved.

8. I feel that the accumulation of this material has accomplished three purposes beneficial to the patient: 1. Patients were seen in the clinic in whom the results of the radical operation were excellent, though the cavity was filled with cerumen. Instructions were given for the future care of these cavities. 2. Patients returned who were greatly in need of local treatment, because of moist cavities from small granulations. 3. Patients in whom it was necessary to remove a large mass of granulations, probably under an anesthetic, were advised to have this done.

One hundred patients were examined. To these a type letter was sent. The cases cover approximately the past ten years. Miss Eleanor Sanger of the Social Service Department has given me great assistance in compiling the data.

AN OPERATION FOR THE RELIEF OF ABDUCTOR PARALYSIS OF THE LARYNX

JOHN EDMUND MacKENTY, M.D.
NEW YORK

Abductor paralysis of the larynx is a comparatively rare disease, especially in its complete manifestation. It may be central or peripheral in origin, and in its etiology is usually syphilitic. Exceptions to this have come under my observation. In two patients goiter was the cause. In one of these the lesion appeared after thyroidectomy and in another, before the operation. Operation did not give relief. Injury of the neck accounted for two cases, one of which was due to shrapnel; in one, the cause could not be located. In the remaining cases, syphilis was demonstrated. The disease is more common in men than in women and is rare in children.

Whatever the cause, the condition may become one of grave import, often causing sudden death from asphyxia. Surgical relief is imperatively indicated in all advanced cases.

In the past, tracheotomy was the only resource. Cordectomy was tried but failed in nearly all cases. Jackson then carried the excision of the cord into the ventricle of the larynx in performing a ventriculocordectomy, thus adding a new and important procedure to the armamentarium.

Considerable, often complete, impairment of the voice follows all these operations (perhaps this is a minor matter when one considers the always imminent danger of asphyxia). Some of the patients coming under my observation had only occasional attacks of dyspnea, and in some the paralysis was not quite complete, giving hope that improvement might occur under treatment. It is in the latter type of case that my operation finds its best application, since it does not remove essential parts and, by a simple procedure, the larynx may be restored to its preoperaive condition.

OPERATION

The operation that I have devised and successfully carried out on several patients is extremely simple in theory. It aims at the establishment of a small permanent opening in the trachea at a point just above where the trachea dips backward into the chest. It was suggested to me by success in securing union between the skin and the mucous membrane in the tracheal stump following laryngectomy. When such union is established, little contraction in the tracheal opening occurs and the cannula can be dispensed with. In practice the operation may be difficult of perfect accomplishment, since its success depends largely on securing a union between the skin and the mucous membrane that is free from scar tissue.

The incision is made in the center line of the neck, beginning over the thyroid cartilage and extending downward about 2 inches. It centers over the thyroid bridge. This bridge is excised close to the thyroid lobe on either side. The pretracheal muscles are removed in the operative area. This exposes an inch or more of the trachea. The tracheal wall is now anesthetized. Between two rings a few drops of a 10 per cent solution of cocaine and five drops of epinephrine hydrochloride are instilled into the lumen of the trachea to allay coughing. An oval section of the trachea wall is now removed, care being taken to leave intact

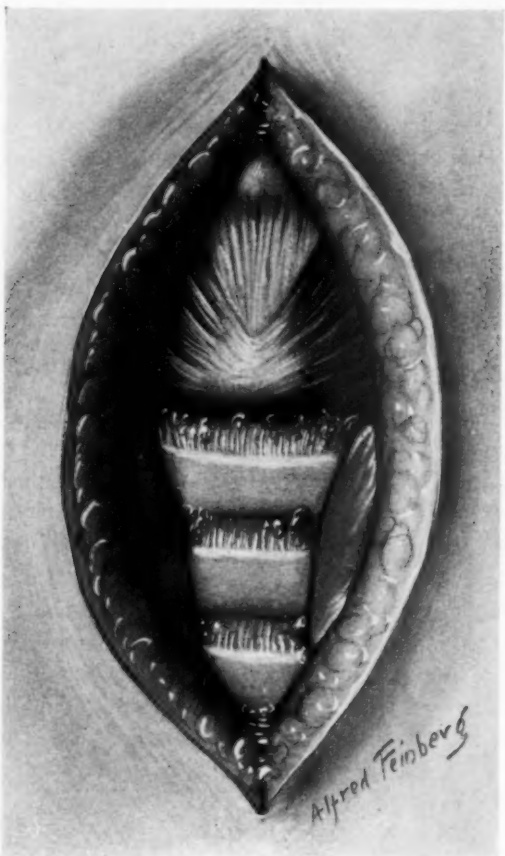

Fig. 1.—Incision showing part of thyroid cartilage, cricoid cartilage and tracheal rings. Thyroid bridge removed.

the tracheal mucous membrane. This oval section should be 1½ cm. long by ¾ cm. wide. In the process of healing this opening contracts to a hole about ½ cm. in diameter.

Skin flaps are prepared by undermining, by removing all fat from the flap edges and by incisions on either side of the central one and parallel to it. All tension on the line of union between the tracheal edge and the skin must be relieved. If one has been successful in removing the oval section of tracheal

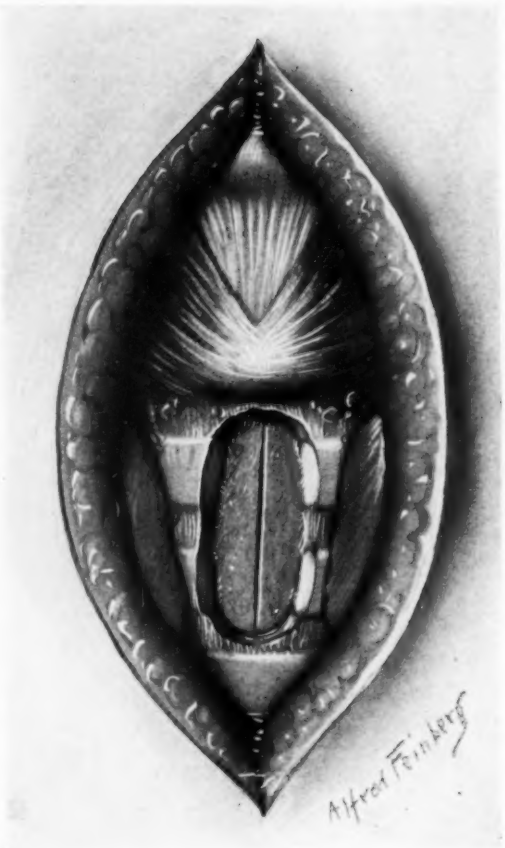

Fig. 2.—Oval section taken from trachea. Mucous membrane of trachea split in the long axis of the opening.

wall without perforating the mucous membrane, the procedure is as follows: The skin flaps are brought to the center and united to the edge of the oval. The diaphragm of mucous membrane closing off the wound from the lumen of the trachea is left intact for four or five days. Then it is split in its long axis and laid up against the union already mentioned, where it is held by the obturator, which will be described later. If the trachea has been opened by a tear in the mucous membrane diaphragm, then the flaps are secured at once both to the mucosa of the trachea and to the edges of the oval. The obturator is inserted at

Fig. 3.—Mucous membrane of trachea everted over the cut edges of the tracheal rings.

once or the opening is plugged with bismuth paraffin gauze. The central incision is closed above and below the opening. The lateral incision is not closed. Two flat hooks made of fairly rigid silver serve to hold the flaps to the center (fig. 7) and to relieve tension. It is essential that no stich pass through cartilage on account of the danger of necrosis and infection. Individual choice may dictate whether a rotated flap be used or one made by incising the skin parallel to the original incision on both sides. The former gives less tension and the latter a better blood supply.

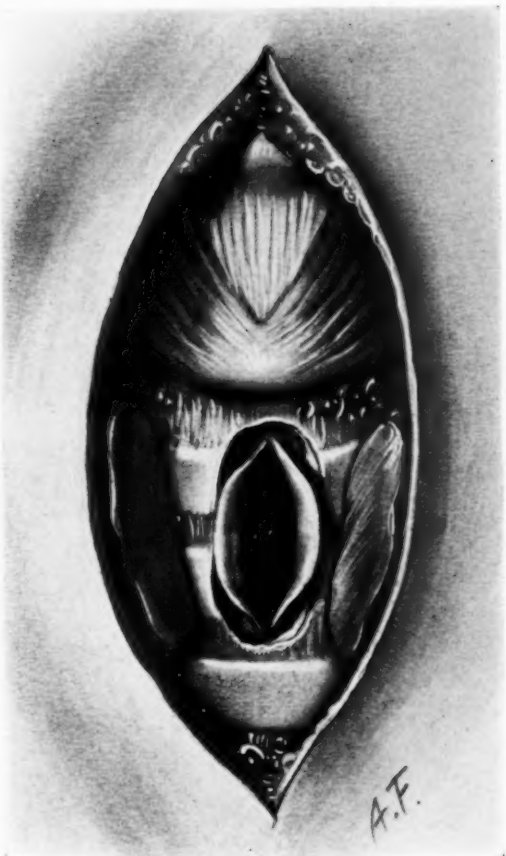

Fig. 4.—Redundant tissue removed that is fat, pretracheal muscles, etc. Flap undermined laterally.

During the period of healing and contraction a small, solid obturator, made of silver and attached to a crosspiece (as in the tracheal cannula) must be worn. The tracheal end of the obturator should project but little beyond the inner surface of the trachea. If dyspnea is constant, an unusual condition in my experience, the obturator may be made tubular or a short, small, tracheal cannula may be substituted during the period of healing.

The air passing through this small opening in the trachea adds to the air inspired through the natural breathway and counteracts the inspiratory pull on

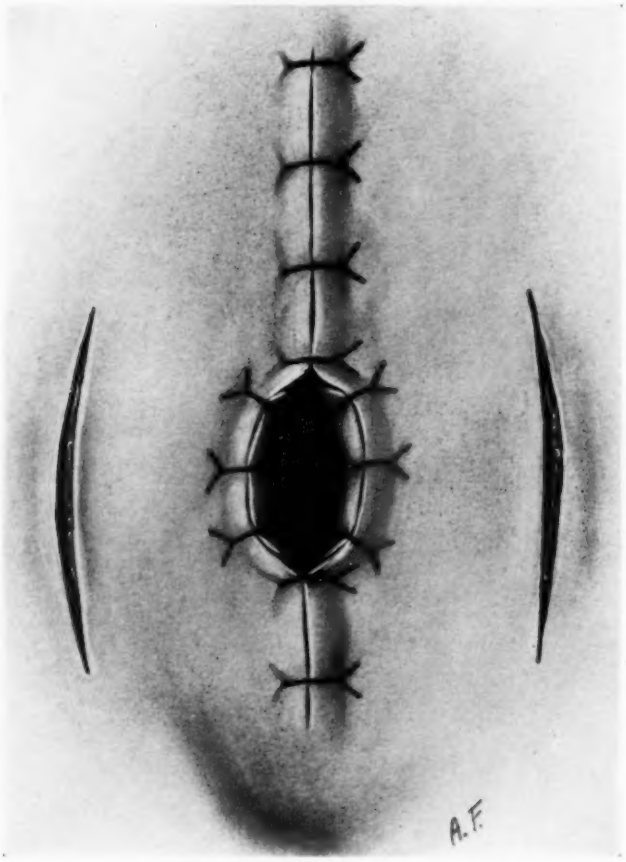

Fig. 5.—Mucous membrane and skin united. The stitches must include the mucous membrane and the tracheal wall. They should not pass through cartilage. Lateral incisions for the relief of tension.

the chords. This pull, as one knows, is the chief factor in reducing the amount of inspired air. The stronger the pull the less air inspired. The opening also acts as a safety-valve during the dangerous spasms of asphyxia so common in abductor paralysis.

The obturator must be worn for several weeks, until the contraction due to healing has ceased. Then in most cases it may be dispensed with. If the opening

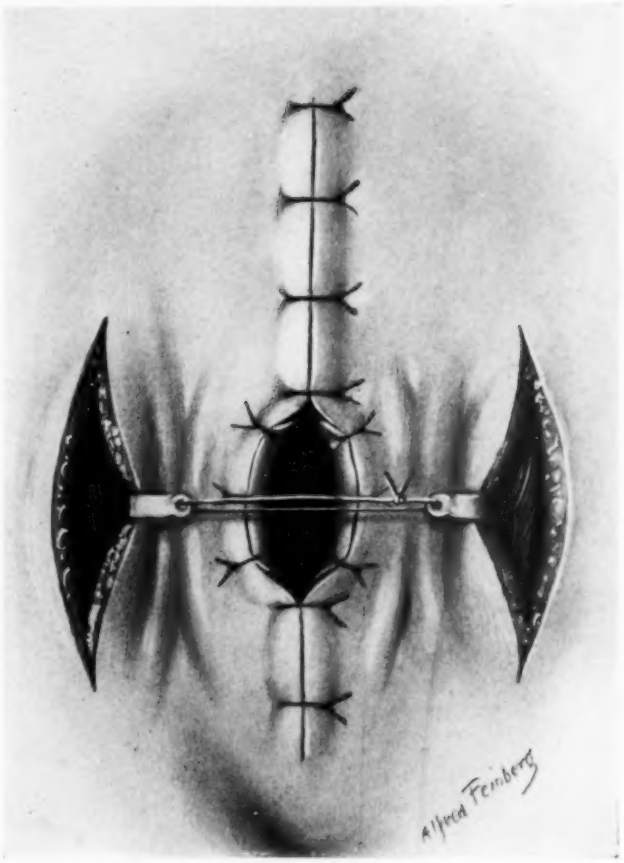

Fig. 6.—Tension hooks in place, causing puckering of the flaps for the relief of tension. Two sets may be used if necessary. The lines connecting the hooks would then cross at the two poles of the opening.

shows a tendency to contract, it should be dilated at times. When union between the skin and the mucous membrane has not been secured, the obturator may have to be worn constantly or for a few hours each day. When dyspnea is constant, the obturator may be cannulized to allow a constant flow of air into the trachea. When the patient wishes to speak, he presses the clothing overlying the opening against it, thus closing it during expiration. The finger may be removed during inspiration and replaced again during expiration if laryngeal breathing is difficult. It is essential that the obturator does not project into the lumen of the trachea

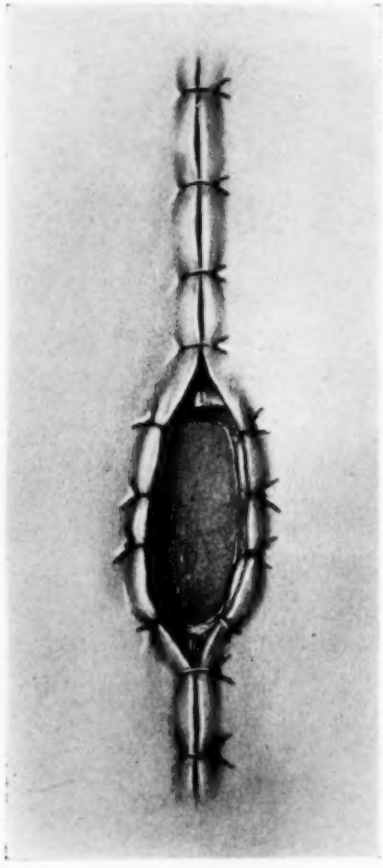

Fig. 7.—Diagrammatic representation of procedure when the mucous membrane diaphragm is left intact until the fifth day, then incised and brought up to cover edges of oval.

far enough to touch its posterior wall. A slight projection beyond the inner tracheal wall is all that is required to keep the opening intact. In some patients there is a strong idiosyncrasy to irritation of any kind responding in the formation of granulomas. These should be treated at their inception by strong silver solution, care being taken to neutralize it and to let none into the trachea. The cannula must be made of pure silver. Serious irritation has resulted in my experience from silver plated cannulas used in the trachea.

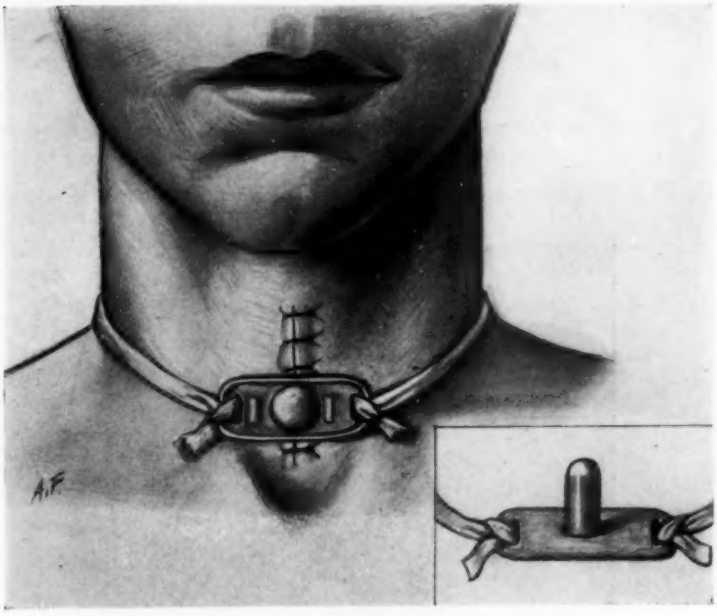

Fig. 8.—Wound closed, with obturator in place.

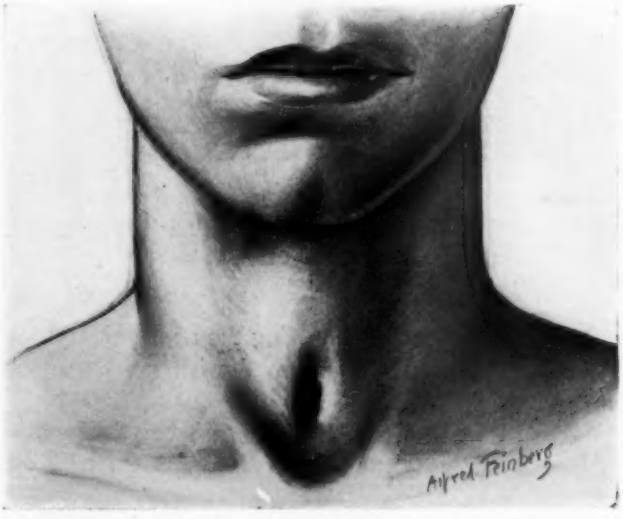

Fig. 9.—End-result. Opening should be small, from ½ to ¾ cm. in diameter.

COMMENT

This simple operation is not intended to supplant ventriculocordectomy. It may be used as an intermediate procedure between tracheotomy and ventriculocordectomy. When time and the patient's condition permit, I would advocate its use instead of tracheotomy, since it dispenses with the troublesome cannula and makes partial oral and nasal breathing possible when the obturator is not used (i.e., when the hole is open).

Fig. 10.—Shrapnel wound of neck causing complete double abductor paralysis. Picture taken one year after operation. Cannula not used after third month. Operation done in 1921. Patient last seen in 1925. Opening, ½ cm. in diameter. No tendency to close.

Low speech is possible without closing the aperture, and loud speech when the clothing of the neck is pressed with the finger against the opening.

If the laryngeal condition improves or if ventriculocordectomy is contemplated, it is a simple matter to close the tracheal opening by everting and sewing the skin over it.

This simple procedure has been most useful in my limited experience with bilateral abductor laryngeal paralysis.

IRRIGATIONS WITH AQUEOUS SOLUTION

THEIR EFFECT ON THE MEMBRANES OF THE UPPER RESPIRATORY TRACT OF THE RABBIT *

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ROCHESTER, MINN.

Irrigation of the nasal fossae with aqueous solution has been advocated for many years in the treatment of various lesions of the nose. Although a great deal has been said concerning the advantages and the technic of intranasal douching, little has been said concerning the histologic changes which take place following repetition of the procedure. Lillie [1] has directed attention to cases in which the nasal mucosa appeared pale, shiny and waterlogged after long-continued irrigation following operation and in which symptoms were relieved and the nasal mucous membranes became more nearly normal when irrigation was discontinued. This occurred frequently enough to indicate that the intranasal douching was responsible for the altered appearance of the nasal mucous membranes. In cases in which operation has not been performed and intranasal irrigations have been used, similar changes in the mucous membrane have been noted. In either case, the picture seen through the nasal speculum is often sufficient in itself to warrant the conclusion that the nose has been douched.

As a first step in ascertaining what changes take place in the nasal mucous membrane following irrigation, it was decided to investigate the effect of irrigating the normal nose of rabbits. The nose of the rabbit is very similar to that of man so far as its anatomy, histology and physiology are concerned. In the rabbit the nasal septum is, for the most part, formed of cartilage. In the lateral and posterior walls are the inferior, middle and superior turbinates. The inferior turbinate is separate; the middle and superior turbinates belong to the ethmoid bone. The maxillary sinus and the large ethmoidal cells open into the nose through ostia situated under the anterior superior portion of the middle turbinate. The nasal mucous membrane is divided, as in man, into an olfactory and a respiratory portion. The olfactory portion is situated on the upper part of the nasal septum, the superior turbinates and most of the middle

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* From the Section on Otolaryngology and Rhinology, Mayo Clinic.

* Thesis submitted to the Faculty of the Graduate School of the University of Minnesota in partial fulfilment of the requirements for the degree of Master of Science in Otolaryngology, 1928.

1. Lillie, H. I.: The Unsatisfactory Effects of Postoperative-Irrigation in Certain Cases of Chronic Suppurative Paranasal Sinusitis, Tr. Am. Laryngol. Rhinol. & Otol. Soc., Arch. Otolaryng. **2**:511 (Nov.) 1925.

turbinate. Over the remainder of the lateral wall, including the inferior portion of the middle and inferior turbinates, the floor and the lower portion of the septum, is spread the respiratory mucous membrane or schneiderian membrane. The olfactory mucous membrane is thin and slightly yellow. The epithelium is stratified, columnar and nonciliated, and contains straight or slightly convoluted tubular glands (Bowman's glands) which pour out a serous secretion.

There is a difference in the thickness of the mucous membrane lining the various parts of the respiratory region of the nasal fossae of the rabbit. The epithelium is stratified, ciliated and columnar, and includes the tall ciliated surface cells, between the inner ends of which lie the irregularly columnar basal cells. In this portion are the mucus-containing goblet cells. Intra-epithelial migratory lymphocytes are common. Sections made of the respiratory nasal mucous membrane of normal rabbits show a film of mucus covering the epithelium. Beneath the

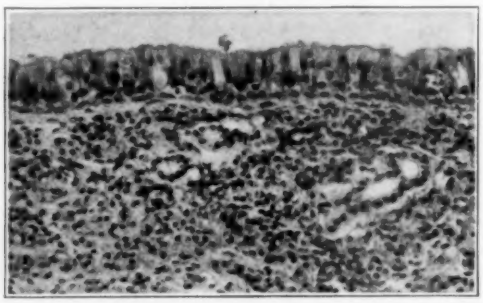

Fig. 1.—Normal mucous membrane of right septum; membrana propria, single layer of cells; × 150.

epithelium is the membrana propria, which, under pathologic conditions, may vary greatly in thickness. In many places, the membrana propria is pierced by minute vertical channels, the basal canals, in which connective-tissue cells and leukocytes are found. The tunica propria consists of bundles of fibro-elastic tissue which are compactly arranged toward the underlying periosteum. The more superficial portion is rich in cells and shows masses of lymphocytes. In certain parts of the nasal fossa, the stroma of the mucous membrane contains vascular areas composed of numerous intercommunicating blood spaces that have the appearance of true cavernous tissue. These areas are particularly well developed over the inferior turbinate and lower margins of the middle turbinate, where, at times, they occupy practically the entire thickness of the mucous membrane from the periosteum to the epithelium. The glands of the respiratory mucous membrane are numerous, from tubular to alveolar in form and of the mixed mucous type. The chief ducts open on the free surface of the epithelium by minute orifices.

For the purpose of this investigation, thirty-two full grown, healthy rabbits which had been under observation for two months or longer, and which were known to be free from snuffles, were used.

TECHNIC

Irrigating solutions, at a temperature of 40 C., were injected slowly through a sterilized small rubber catheter inserted about 1 cm. into the right anterior naris. The solution was returned through both anterior nares and through the mouth. Some of the animals objected to the irrigation, but most of them did not show evidence of discomfort during the procedure. In one rabbit, irrigation was resorted to three times; in others, from four to twenty-four times. One irrigation each day was given in the first series, and necropsy was performed twenty-four hours after the last irrigation. The lungs, nasal mucous membranes and paranasal sinuses were examined. In each case, specimens of mucous membrane were taken from both sides of the nose, the septum, the middle turbinate, the lateral wall and

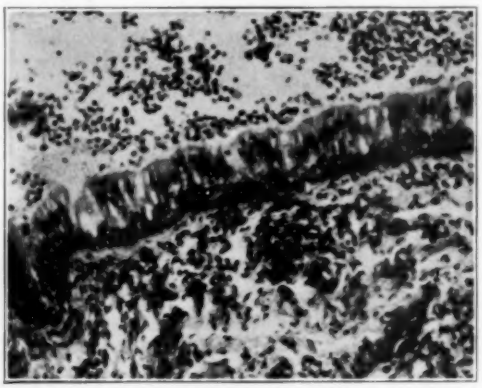

Fig. 2.—Mucous membrane of right lateral nasal wall; marked inflammatory exudate; membrana propria thickened; leukocytic infiltration in tunica propria; × 150. The nose had been irrigated seven times with 0.9 per cent sodium chloride solution. Macroscopically, there was bilateral mucopurulent sinusitis.

usually from the maxillary sinus. These specimens were placed in Zenker's fluid, corrosive acetic fixing fluid, 10 per cent formaldehyde, or Orth's fluid and were later sectioned and examined.

RESULTS

The rabbits were grouped as follows: (1) eight rabbits were irrigated with 0.9 per cent sodium chloride solution; (2) five were irrigated with tap water; (3) seven were irrigated with 2 per cent sodium chloride solution; (4) eight were used as controls, and (5) four were irrigated with 2 per cent sodium chloride solution.

Group 1.—Of the eight rabbits in this group three died, one after the fourth irrigation, one after the eighth and one after the twelfth. Necropsy showed that bronchopneumonia was the cause of death. In all three animals, there was mucopurulent sinusitis. In one rab-

bit, the paranasal sinuses on the left side were affected. In another, the affected sinuses were on the right side. In the third rabbit, which had been irrigated twelve times, the sinuses on both sides were affected. One of the remaining five rabbits was killed after the ninth irrigation, two after the twentieth, one after the twenty-second and one after the twenty-fourth. The animals killed after the ninth, twenty-second and twenty-fourth irrigations had healthy lungs and sinuses. The two killed after the twentieth irrigation had bronchopneumonia and bilateral mucopurulent sinusitis; one of these had purulent mediastinitis. Thus five of the rabbits had mucopurulent sinusitis and definite broncho-

Fig. 3.—Normal mucous membrane of middle turbinate; cilia stands out; surface of epithelium unbroken; membrana propria, single layer of cells; × 980.

pneumonia, and none of the three with clear sinuses showed evidence of pneumonia.

GROUP 2.—One of the five rabbits in this group died following the sixth irrigation. Necropsy showed the presence of bronchopneumonia and mucopurulent sinusitis involving the sinuses on both sides. The four remaining animals were killed after the twenty-first, twenty-second and twenty-fourth irrigations. The sinuses of one rabbit appeared normal. The other three rabbits had mucopurulent sinusitis: In two, the left side only was affected; in the other, the sinuses on both sides were affected. In all four rabbits, the lungs were normal. The rabbit without evidence

of sinusitis following the twenty-second irrigation had healthy lungs, and only one of the four rabbits with mucopurulent sinusitis showed evidence of bronchopneumonia.

GROUP 3.—Four of the seven rabbits in this group died, one each died following the third, fourth, eighth and twelfth irrigations, respectively. The irrigating fluid reached the lungs of two rabbits and they suffocated. Three had mucopurulent sinusitis; in one the right side only was affected and in two both sides were affected. The sinuses of one rabbit were clear. All four had bronchopneumonia. Two of the three rabbits which were killed following the ninth, nineteenth and twenty-third irrigations had mucopurulent sinusitis. The sinuses of one were clear. The lungs of all three appeared healthy.

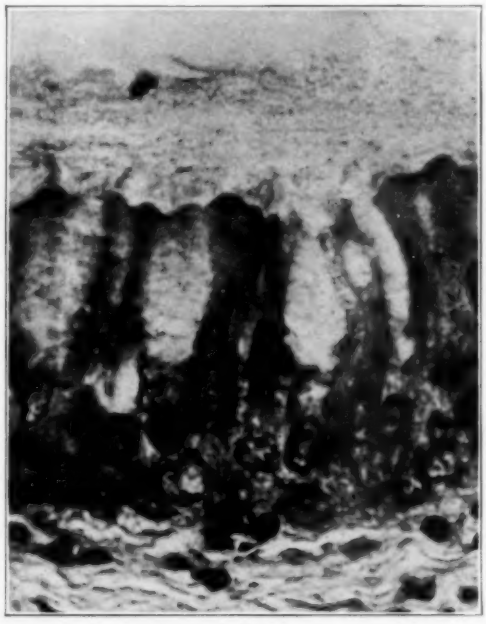

Fig. 4.—Mucous membrane of left lateral nasal wall; vacuoles full, thick mucous exudate on surface; × 980. The nose had been irrigated seven times with 0.9 per cent sodium chloride solution. Macroscopically, the mucous membrane was thickened; there was no sinusitis.

Five of the seven rabbits in this series had mucopurulent sinusitis. Three of these had bronchopneumonia; the lungs were clear in the other two. One rabbit, the sinuses of which appeared healthy, had bronchopneumonia; one had normal sinuses and lungs.

GROUP 4.—At necropsy, each of the eight control animals had healthy sinuses and lungs.

The appearance of mucopurulent sinusitis in the foregoing groups, even after a few irrigations, as in the case in which 2 per cent solution of sodium chloride was used three times, and in the case in which 0.9 per cent sodium chloride solution was used four times, suggested the observation of another small group of animals with reference to the appearance of the sinuses shortly after irrigation.

GROUP 5.—Four healthy rabbits were irrigated with 200 cc. of 2 per cent sodium chloride solution at 40 C. One was irrigated four times, one five times, and two six times. The irrigations were given on successive days. They were examined from fifteen to thirty minutes after

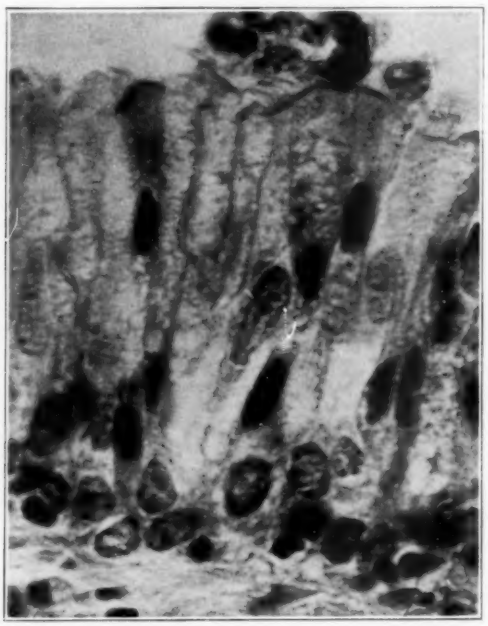

Fig. 5.—Mucous membrane of left preturbinate region; epithelial cells enlarged; the surface of the epithelium is irregular; inflammatory exudate; increased number of leukocytes in tunica propria; × 980. The nose was irrigated six times with 2 per cent sodium chloride solution. Macroscopically, there was bilateral mucopurulent sinusitis.

the last irrigation. All had mucopurulent sinusitis. The sinusitis was on the right side of the rabbit irrigated four times, and bilateral in the animals irrigated five and six times. Three rabbits had early bronchopneumonia. In the three with bilateral mucopurulent sinusitis, the sinuses were full of mucopus and irrigating fluid. The sinuses of the animal with unilateral sinusitis were filled with irrigating fluid on the unaffected as well as on the affected side.

SUMMARY OF POSTMORTEM DATA

Five (63 per cent) of the eight rabbits in the first group which were irrigated with 0.9 per cent sodium chloride solution had mucopurulent sinusitis; four (80 per cent) of the five rabbits in the second group which were irrigated with tap water had mucopurulent sinusitis; and nine (82 per cent) of the eleven animals in the third and fifth groups which were irrigated with 2 per cent sodium chloride solution had mucopurulent sinusitis.

Eighteen (75 per cent) of the twenty-four rabbits irrigated had mucopurulent sinusitis, and twelve (67 per cent) of these had bronchopneumonia; thirteen (54 per cent) of all the rabbits irrigated had bronchopneumonia, and of these, twelve (92 per cent) had mucopurulent sinusitis. The nasal mucous membrane of all irrigated animals appeared thicker than the membrane of the control animals and suggested the presence of edema.

Because of the finely irregular structure of the inferior turbinate, the specimens of mucous membrane from this area were not satisfactory. The specimens from the middle turbinate, the lateral wall, the floor, the septum and the maxillary sinus presented a fairly uniform picture in the control rabbits, varying for the most part only with the site from which they were taken. The epithelium in the sections from the controls showed, besides the columnar cells arranged in layers, goblet cells of varying number and size. In most sections, the cilia stood out well on the epithelial surface and in many sections the epithelium was thinly covered with mucus. The membrana propria next to the epithelium was usually clearly shown, being formed of a single layer of cells. Beneath this layer was the tunica propria with its fibro-elastic tissue, mixed mucous glands, blood vessels and an occasional group of lymphocytes.

All the sections of irrigated mucous membrane showed changes from normal. The epithelial cells were larger and their outlines less distinct than in the normal mucous membrane. Cilia could seldom be seen. The goblet cells were distended, and in many sections, in place of the thin layer of mucus on the epithelium of the control animals, there was a heavy layer of mucus, polymorphonuclear leukocytes and epithelial débris. In some sections, the cells of the membrana propria were distinctly outlined as a single layer, but in most sections the outline was indistinct and often the layer was irregularly thickened. The tunica propria showed an increase in the number of leukocytes. The blood vessels were dilated, the cells of the mixed mucous glands were swollen, and the lumen of the gland was filled with mucus.

COMMENT

At the beginning of the investigation, it was hoped that it would be possible to irrigate satisfactorily one side of the nose and use the other

side as a control. This was found to be impracticable, because the irrigating solution bathed both sides.

It seems reasonable to assume that the changes in the mucous membrane of the nose of a human being as the result of irrigation would be similar to those occurring in the nose of the rabbit, and that such changes may account for the "waterlogging" in the irrigated nose of man. Edema, per se, of the rabbit's nasal mucosa was not demonstrated in the sections; it may, however, have been present and not detected. The increased fulness of the mucous membranes as a result of the increase in glandular activity, the increase in size of the vacuoles because of the increased content and the enlargement of the individual epithelial cells occurring as part of the inflammatory process would, in themselves, adequately account for the water logged appearance.

The solution and not the number of irrigations was probably the greater factor in determining the degree of reaction of the nasal mucosa. As has been noted, nine of eleven rabbits irrigated with a 2 per cent sodium chloride solution and four of five irrigated with tap water showed the presence of mucopurulent sinusitis at necropsy, while five of the eight rabbits irrigated with 0.9 per cent sodium chloride solution showed gross evidence of sinusitis. Microscopic study of these membranes disclosed corresponding variation in the degree of inflammatory change shown.

The number of rabbits irrigated was not large, and from the standpoint of statistical evidence, the different results obtained with the three solutions do not prove that one solution was more irritating to the nasal mucosa than another. However, the observation suggests that an isotonic solution may be less irritating to the nasal mucosa than a hypertonic solution.

Whether the inflammatory changes in the mucosa were the result of infection following irrigation, or of mechanical irritation of the mucous membrane, was not investigated. The observations suggest, however, that mechanical irritation played a definite part.

The pneumonia in the irrigated rabbits was, with one exception, confined to those having mucopurulent sinusitis; that is, of the eighteen rabbits twelve had pneumonia, and in only one rabbit in which there was no evidence of sinusitis was there any suggestion, grossly, of pneumonia.

SUMMARY

The nasal fossae of twenty-four rabbits were irrigated with 0.9 per cent sodium chloride solution, tap water, or 2 per cent sodium chloride solution, at a temperature of 40 C., and eight healthy rabbits were used as controls. Irrigations, varying from three to twenty-four, were made daily. Examinations were made in some instances a few minutes after

the last irrigation; in others, twenty-four hours afterward. At necropsy, 75 per cent of the rabbits irrigated were found to have mucopurulent secretion in the nasal fossae and in the paranasal sinuses. The animals examined from fifteen to twenty minutes after irrigation showed that the paranasal sinuses on both sides were filled with irrigating fluid, whereas the sinuses of rabbits examined twenty-four hours after irrigation were clear of irrigating fluid. Of the eighteen rabbits having mucopurulent sinusitis, the sinusitis was on the right side in three, on the left in four and on both sides in eleven.

The reaction of the nasal mucous membrane to 2 per cent sodium chloride solution and to tap water was more marked than the reaction to the 0.9 per cent sodium chloride solution. Varying degrees of change were noted macroscopically and microscopically in the mucous membrane: hyperemia with marked leukocytic infiltration, increased glandular activity, and increase in the size of vacuoles and epithelial cells.

THE HISTOLOGY AND PATHOLOGY OF THE ARTICULATION OF THE AUDITORY OSSICLES

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A number of authors, particularly the German, have studied the articulation of the malleus and incus, and of the incus and stapes. They have been interested chiefly from the physiologic standpoint, that is, to determine whether the individual ossicles are flexible or whether the connections between them are such that they are fixed. The different authors vary in their descriptions of the articulation of the auditory ossicles. Also, in studying the works on otology in which the various pathologic processes of the middle ear are described, one finds little mention of the ossicles, so that one is apt to get the impression that there were no pathologic changes. However, of the pathologic conditions, ankylosis is practically the only one that has been considered.

I have had the opportunity to study numerous series of normal and pathologic microscopic sections of the ear in Professor Alexander's laboratory in Vienna, with an idea of obtaining a clearer conception of the histologic and the pathologic conditions of the auditory ossicles.[1] It is perhaps first advisable to consider the normal histology. The articulations between the malleus and incus, and the incus and stapes are similar in their histologic structure (figs. 1, 2 and 3). From within the bone toward the articulating surface, four distinct layers of tissue may be distinguished. Three of these are more or less constant; one is variable in different cases. They are:

1. A bony layer containing its typical corpuscles and medullary spaces. As the cartilaginous border is approached, they are gradually replaced by cartilaginous cells.

2. A layer of calcified cartilage which is adjacent to the bone and its medullary spaces. This cartillaginous layer when stained with hematoxylin takes on a bluish appearance and contains vesicular cell nuclei with clear chromatin which are arranged in a disorderly fashion. Many bluish granules are scattered throughout this layer. An irregular wavelike line separates it from the underlying bony tissue.

3. A layer of hyaline cartilage which differs from the preceding one in that it assumes a much lighter stain is usually much broader and much more homogeneous in substance. Within the layer, cells with

1. The illustrations in this article are from photomicrographs made from Dr. Alexander's preparations and are published with his consent.

nuclei are found which vary in size and in shape; some are large and vesicular with distinct chromatin content, others are darkly stained, small and irregular and are surrounded by a pale halo.

4. The terminal layer. This layer varies in different cases, and it is for this reason that the descriptions made by the various authors who have studied this question both macroscopically and microscopically differ in their description. Histologically, this layer has at times the appearance of cartilage with distinct cartilage cells, although it stains much brighter as compared with its adjacent layer. In some cases,

Fig. 1.—Normal malleus incus articulation. *M* indicates the malleus; *I*, the incus; *a*, bony layer; *b*, calcified cartilage layer; *c*, hyaline cartilage layer, and *d*, terminal layer.

bundles of connective tissue fibers are found in this cartilaginous layer, so that the histologic structure reminds one of fibrocartilage. In others, long fibers with longitudinal nuclei are found which give one the impression of its being connective tissue; others are composed of homogeneous substance without any cellular elements, and, finally, in some one finds on the cartilage a thin layer of tissue with flat, longitudinal nuclei having the appearance of endothelium.

Very often this terminal layer fuses with the corresponding layer of the other ossicle, giving the histologic picture of a continuous transi-

tion from one ossicle to the other, i. e., symphysis formation without the presence of any articulating surface in the joint. At times, there seems to be a separation of this layer from the adjacent cartilaginous layer, which in all probability is an artefact. In some cases, this fissure has a straight course, and at times is irregular, running across the tissue in a zigzag fashion. If this fissure formation takes place in both ossicles, a structure will appear within the joint, which closely simulates a meniscus.

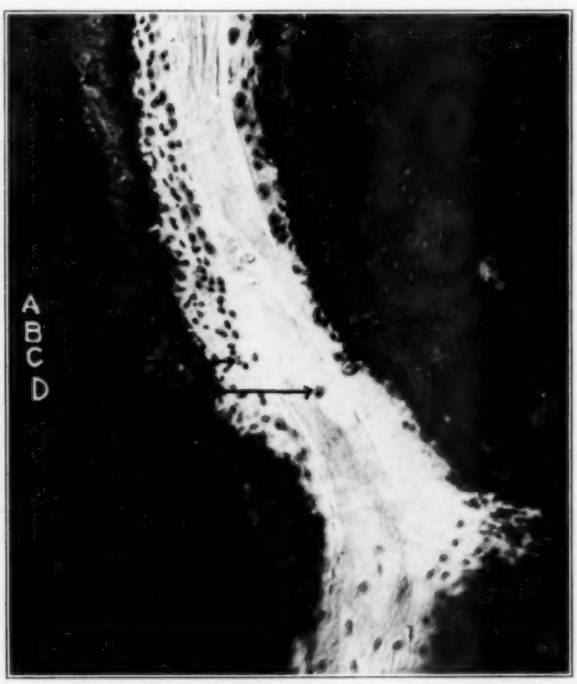

Fig. 2.—Same as figure 1; higher magnification. *a* indicates bony layer; *b*, calcified cartilage layer; *c*, hyaline cartilage layer and *d*, terminal layer.

Externally, the articulation is closed by a rigid capsule consisting in most cases of fasciculi of fibers with longitudinal nuclei. In rare instances, the fibers are crossed. Owing to the fact that the head of the malleus is rounded, the distance between it and its articulating ossicles is much less in the middle of the joint than it is at the surface, and as a result the cartilaginous layer and particularly the terminal layer is widened considerably at the margins and often has the shape of a wedge. This wedgelike mass often extends as far as the capsule, receiving connective tissue bundles from it. At times, it is absolutely distinct from the invading capsule.

These histologic pictures not only vary in different joints, but at times vary in the same joint.

Frey,[2] basing his views on his comparative anatomic studies in animals, states that the malleus incus articulation is not a real joint in the true sense of the word, and the same condition obtains in man. He maintains that the ossicles are united by means of connective tissue fibers in which islands of cartilage cells are present, and that the cartilaginous layer is not separated from the connective tissue layer by any sharp border. He also states that karyolysis is often present in this layer,

Fig. 3.—Normal incostapedial articulation. *I* indicates incus; *S*, stapes.

which may be the cause of the cavity formation. Furthermore, the capsule is in direct communication with the connective tissue layer within. In various cases of suppuration of the temporal bone, Frey found partly or completely osseous connective tissue-like ankyloses, and the terminal layer consisted of either hyaline cartilage or fibrocartilage in combination with a homogeneous substance. The presence of a meniscus was beyond question.

2. Frey: Verhandl. d. deutsche. Otol. Gesellsch., 1910, p. 113; Anat. Hefte, 1911, vol. 44, p. 365.

Schmidt, on the other hand, describes a meniscoid form of articulation, but it is not a meniscus, in the true sense of the word, as is present in some of the articulations between the long bones. The meniscoid form is rare, but when it does occur it is usually over a wide area between the two layers of cartilage. He considers this type of articulation as a kind of symphisis formation, and his descriptions are in accordance with ours. Other authors, like Brunner and Kessel, oppose this view and consider the terminal layer a meniscus in a true joint.

Fig. 4.—Suppuration of the middle and inner ear, showing marked purulent suppuration within malleus incus joint. *M* indicates the malleus; *I*, the incus and *c*, exudate.

STUDY OF MICROSCOPIC SECTIONS

Of the thirty-seven series of normal and pathologic temporal bones studied, which included embryos, children and adults, the anatomic or clinical diagnosis in these cases were as follows: normal, four; acute and chronic suppuration of the middle ear, including cholesteatomas, thirteen; suppuration of the middle and inner ear, three; Paget's disease, two; choked labyrinth with tumor of brain, two; syphilis with degeneration in the inner ear, one; fractures of the base of the skull involving the ears, three; labyrinthine deafness, three; osteogenesis

imperfecta, two; congenital atresia, two; anencephalus, one, and endothelioma of middle ear, one.

Of all the specimens studied, there were comparatively few joints which showed any marked pathologic changes; some of them, however, deviated considerably from the foregoing descriptions, but were still within the limits of the normal picture. In one case of labyrinthine suppuration, the pathologic changes were extremely interesting (fig. 4). The capsule of the malleus and incus articulation showed an opening in

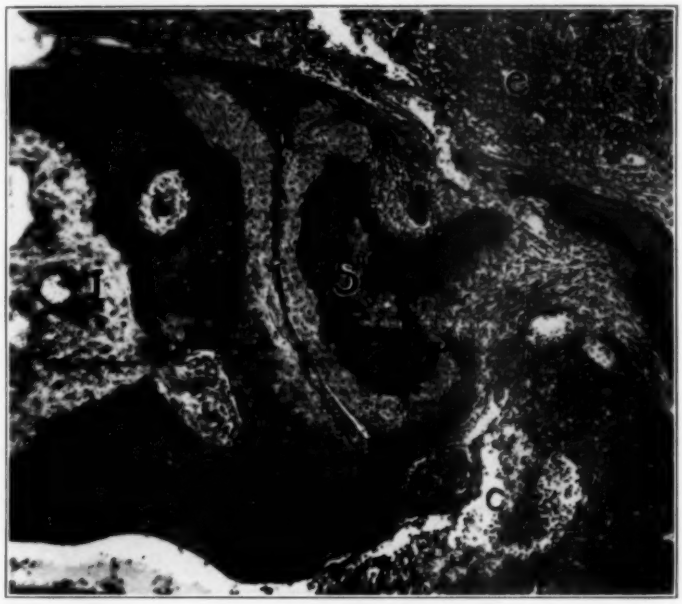

Fig. 5.—Suppuration of middle ear showing marked purulent exudate around incostapedial joint, yet the joint itself is free of involvement. *I* indicates the incus; *S*, the stapes and *c*, the exudate.

almost its entire circumference, and there remained only its shrunken, retracted margins. The cartilaginous surface of the malleus had been eroded and was missing over a large area. The remaining cartilage was bundled in the form of hemogeneous nodules, taking a poor hematoxylin stain. The bony substance of the malleus, the little cartilage that remained and the free space between it and the incus were infiltrated by a considerable number of pus cells. The long process of the incus was destroyed; only the head of the stapes was still intact, being embedded in a mass of granulations, its cartilaginous surface infiltrated with pus cells and showing evidence of necrosis.

It is of extreme interest to note that inflammation and suppuration in the articulation of the auditory ossicles is a rare occurrence. I found

this pathologic condition in only one of the thirty-seven cases, in spite of the fact that an acute or chronic suppuration of the middle or inner ear had occurred in sixteen. In some cases, the entire middle ear was filled with pus and granulations, these granulations actually involving the outer ligaments of the capsule and destroying the ossicles themselves; yet the articulations were free from pathologic change (fig. 5). This same condition was observed in a case in which almost the entire middle ear was filled with an endothelioma without involving the joints. Little mention is made of this fact in the literature. Hannemann,[3] however,

Fig. 6.—Fracture of the skull showing hemorrhage into malleus incus articulation. *M* indicates the malleus; *I*, the incus, *h*, hemorrhage.

refers to this in describing a case of tuberculous suppuration of the middle ear in which tuberculous granulations were found in the malleus incus articulation. The real explanation for these conditions cannot be given. However, it would seem logical to assume that the strong capsule surrounding the articulation acts as a barrier to the suppuration outside the capsule in the middle ear and plays a considerable rôle in protecting

3. Hannemann: Ztschr. f. Ohrenh. **64**:149, 1902. Schwartz: Handbuch der Ohrenheilkunde, 1892.

the structures within. Only on rare occasions does this barrier give way to the invading organisms or invading tumor.

The second case of interest is one of fracture of the base of the skull extending through the tegmen tympani, hypotympanum and outer part of the auditory canal. Here an effusion of blood was seen in the malleus incus articulation extending into the capsule itself (fig. 6). There was a definite rent in the capsular ligament. Incidentally, bloody effusion was also seen in the incus-stapes joint. This is the only one of the three cases of fracture of the skull involving the middle ear in which a bloody effusion or any other pathologic change was seen in the joints. The

Fig. 7.—Incostapedial articulation showing intra-articular ankylosis cartilaginous. *A* indicates ankylosis and *a*, the remains of the joint cavity.

number of cases are too few to allow one to draw any conclusions. From a mechanical standpoint, it would appear that in view of the fact that the ossicular chain lies free in a cavity, the tympanic cavity, connected to the cranium only by ligaments, the trauma produced would have to be of terrific force to cause a hemorrhage in the malleus incus or incostapedial articulation.

In a case of syphilis with degeneration of the labyrinth, an intra-articular cartilaginous ankylosis in the incostapedial joint was present (fig. 7). The two ossicles were united by means of a cartilaginous bridge in the center of the joint. To one side, the joint was free, while on the other side, in the space between the cartilaginous surfaces and within

the layers of cartilage, an abundance of fibrous tissue was present. The condition resulted in a deformity of the long process of the incus. It is of interest to note that there were no evidences of any inflammatory process, either acute or chronic, within the middle ear. The malleus incus articulation was normal. Frey,[2] Hammerschlag [4] and Hannemann,[3] in summarizing the literature, came to the conclusion that ankylosis of the malleus incus articulation is the result of suppuration of the middle ear, more particularly when it follows caries of the auditory canal. However, they mention the fact that most of their conclusions were based on macroscopic observations, and little work had been done microscopically. In view of Frey's comparative anatomic studies, I was led to believe that ankylosis of the auditory ossicles represents a phylogenetic variety (atavism). This is borne out by the fact that ankylosis of the joint is encountered in ears which do not show evidence of an existing purulent inflammatory process or of a healed process in the ear. Also it is possible that ankylosis and suppuration might exist simultaneously without any etiologic relationship.

The only other case of significance is one of congenital atresia of the bony auditory canal in a premature infant. In this case, the malleus and incus were fused, forming one large osseus body at one site, and only for a short distance was there any evidence of any articulating cartilaginous surfaces. This area was probably the rudiment of the malleus incus articulation. Besides this case, Alexander and Benesi [5] describe an osseus union of the malleus and incus in a case of congenital atresia in a deaf mute, 30 years of age. This pathologic condition is undoubtedly a congenital deformity of development. It must be borne in mind that according to some authors the malleus and incus are developed from the first branchial arch, whereas the stapes is developed from the second.

A good many of the other cases studied showed deviations from the normal, but to my mind were not pathologic.

CONCLUSIONS

1. The normal histology of the articulation of the malleus and incus and stapes consists of four layers in each ossicle, three of which are more or less constant while the fourth is variable: (*a*) bony layer, (*b*) calcified cartilage layer, (*c*) hyaline cartilage and (*d*) terminal layer (resembling fibrocartilage, connective tissue, endothelium, etc.). As a result of this fourth layer, different pictures of the normal are present.

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4. Hammerschlag: Arch. f. Ohrenh. **55**:82, 1902; Handbuch der speziellen pathologie Anatomie und Histologie, vol. 12.

5. Alexander and Benesi: Monatschr. f. Ohrenh. **55**:175, 1921.

2. The articulation, in my opinion, is not that of a real joint in the true sense of the word, but is rather a type of symphysis between the two ossicles.

3. Ankylosis of the ossicles, which is a comparatively frequent occurrence, may be classified in the group of normal and may be considered a phylogenetic variety.

4. These articulations are seldom the seat of pathologic conditions. This in all probability is due to the resistant capsule surrounding the joint. In only one case of the thirty-seven examined, including sixteen cases of suppuration of the middle and inner ear, was there also suppuration within the joint.

CONGENITAL ESOPHAGEAL STENOSIS*

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Considered from the embryologic point of view, congenital atresia of the esophagus is surprisingly rare. Plass,[1] reviewing the literature in 1917, was able to find only 204 cases, and in Holderman's [2] survey, ten years later 218 cases were reported. The trachea develops as an outgrowth from the primitive alimentary canal by a pouching of its ventral wall. Later, separation is effected by the downgrowth of the lung bud and the upward extension of the notch between the lung bud and the esophagus. Faulty development of this tracheo-esophageal septum (Keibel and Mall) [3] or unequal division of the primitive tissue (Klebs) [4] results in various forms of congenital esophageal atresia. In by far the largest group of these cases, the upper portion of the esophagus ends blindly in a more or less dilated culdesac, while the lower portion enters either the trachea near its bifurcation or, more rarely, a main bronchus. Other variations have been reported. The esophagus may have developed normally except for a trancheo-esophageal fistula. Upper and lower esophageal segments may be formed, totally separated or connected by a fibrous strand. An upper culdesac alone may develop with or without connection with the stomach by a solid strand of tissue. Still more rarely the esophagus may be represented by a solid cord throughout, and in seven cases collected by Plass it has been reported entirely missing. Finally, the esophagus may be completely occluded by a diaphragm-like membrane frequently found near the upper or lower ends.

The clinical picture in these cases of complete atresia is well known. The child, after a few minutes at the breast, stops breathing, becomes cyanosed and regurgitates its feeding. Respirations may be rattling and noisy. The obstruction can be demonstrated by passing a soft catheter into the esophagus under the fluoroscope or by direct esophagoscopy. Surgical intervention, usually in the form of gastrostomy, has proved of no avail, and no child has survived longer than the fourteenth day.

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1. Plass, E. D.: Congenital Atresia of the Esophagus, Johns Hopkins Hosp. Rep. **18**:259, 1919.

2. Holderman, H. H.: Congenital Atresia of the Esophagus, Arch. Surg. **14**: 917 (April) 1927.

3. Kiebel, F. and Mall, F. P.: Human Embryology, vol. 2, Philadelphia, J. P. Lippincott Company, 1919, p. 312.

4. Klebs, quoted by Kreuter, E.: Deutsche. Ztschr. f. Chir. **79**:1, 1905.

In certain patients, however, obstruction is not complete. An opening, often surprisingly small, permits the ingestion of liquids, and by careful feeding life may be maintained for many years. In one of Vinson's [5] cases, for example, a boy, aged 17, had lived principally on milk since birth. In some children, the stenosis is less marked and symptoms are not noted until solids are added to the diet, while certain patients go through life with little or no dysphagia except when improperly masticated food is ingested. (Arens and Bloom [6] reported a case of

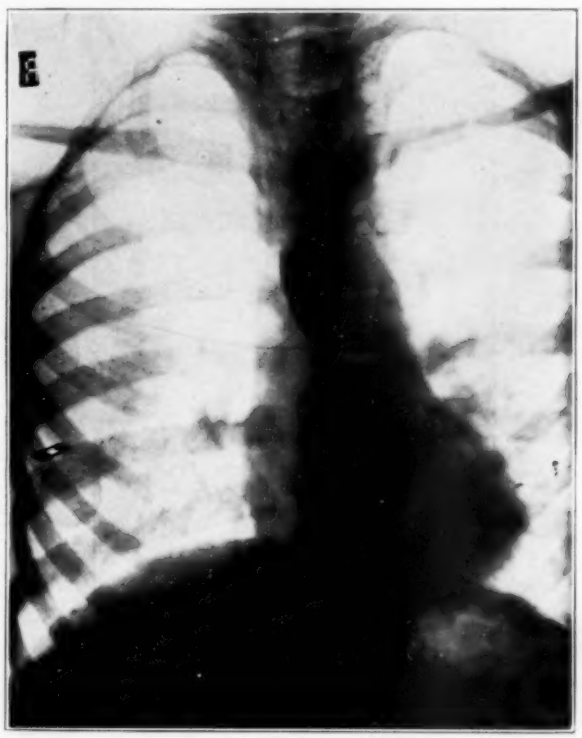

Fig. 1.—Stenosis at the level of the seventh dorsal vertebra; the small finger-like projection represents the actual continuation of the lumen.

congenital stenosis occurring in a woman, aged 67, who had had periods of dysphagia for over forty years.) The strictures in these patients may take the form of a thin perforated web, single or multiple, or, according to Jackson,[7] may actually involve a third or more of the length of the

5. Vinson, P. P.: Congenital Strictures of the Esophagus, Collected Papers of Mayo Clinic **15**:3, 1923.

6. Arens, R. A., and Bloom, A. R.: Radiology **6**:163, 1926.

7. Jackson, C.: Bronchoscopy and Esophagoscopy, Philadelphia, W. B. Saunders Company, 1927, p. 321.

esophagus. Bouginage has been attempted in these cases with great success. It may be carried out under direct vision through the esophagoscope or indirectly, following the technic described by Plummer, by means of olive tip bougies guided carefully through the strictured area along a tautly drawn silk thread, anchored in the stomach. In cases with a gastrostomy opening, retrograde dilations may be employed using the Tucker retrograde bougies. Too rapid dilations should be avoided. In severe cases, careful regulation of diet as well as patient insistence on proper mastication is necessary. Stenosis of cicatricial origin can be readily differentiated from the congenital type

Fig. 2.—Length of the esophagus involved by the stricture (taken shortly after the beginning of dilatation).

by the history as well as by the evidence of scarring visible through the esophagoscope. In these cases the stenosis yields less promptly to bouginage, and the danger of recurrence is far greater than in the congenital variety.

The following case of congenital stenosis is of interest because of the length of the esophagus evidently involved. I. B., a girl, aged 8, was brought to the Strong Memorial Hospital on Oct. 21, 1927, because of marked difficulty in swallowing and vomiting which had begun a few weeks after birth. Although her diet had been carefully restricted to nourishing liquids, vomiting occurred regularly after every meal. She

had failed to gain in weight and strength and had grown morose and unsocial in all her reactions. The general physical examination showed nothing of interest except striking evidence of undernutrition. The child was 19.8 pounds (9 Kg.) below her calculated normal weight. Fluoroscopic and roentgen-ray studies after ingestion of barium showed a moderate dilatation of the esophagus in the upper portion ending in a point of apparently complete obstruction at the level of the seventh dorsal vertebra (fig. 1). Even after large doses of atropine, progress of the barium beyond this point could not be detected. On the following day, a direct esophagoscopic examination was performed. The upper part of the esophagus showed moderate dilatation but no evidence of cicatricial changes. Eighteen centimeters from the upper incisor tooth the lumen apparently ended abruptly, but careful search disclosed a small opening near the left lateral wall of the pouch just large enough to admit the tip of the smallest size Jackson bougie. This was carefully passed through the strictured area into the stomach. The next size bougie was then passed without difficulty. Following this, immediate improvement in swallowing was noted. A roentgenogram taken shortly after the beginning of treatments showed a strictured area involving the entire middle third of the esophagus (fig. 2). Weekly dilations were carried out, at first directly through the esophagoscope and later by the Plummer method. A marked anacidity was corrected and proper mastication patiently insisted on. Five months after the beginning of dilations, the child was eating without difficulty and had gained her calculated normal weight.

CONCLUSION

The prognosis in cases of congenital esophageal stenosis, even of marked degree, is excellent. Careful dilatations by any one of a variety of methods will usually result in ultimate cure. An unusual case of congenital stricture involving the entire middle third of esophagus is reported.

A SUGGESTION REGARDING THE TREATMENT OF CONDITIONS ORDINARILY INCLUDED UNDER CHRONIC CATARRHAL OTITIS MEDIA

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The local treatment for the ear itself ordinarily includes dilatation of the eustachian tube, inflation of air into the middle ear, pneumatic massage of the drum membranes and chain of ossicles, and the introduction of medicated vapors into the eustachian tube and tympanum. The suggestion for treatment that I shall make is a device by which all four of these methods or adjuncts to local treatment are combined. It consists first of a pump and of a catheterizing eustachioscope. The latter has been described fully in the *New York State Medical Journal*[1]

Fig. 1.—The catheterizing eustachioscope, consisting of a catheter guide and a nasopharyngoscope. Two guides are provided, one for the right ear and one for the left, in order to make possible the entry of the catheter into the respective ears.

and is a device which permits a catheter to be introduced into the eustachian tube under direct vision (fig. 1). The pump (fig. 2), produced by the Sklar Surgical Instrument Company, is a two cylinder apparatus with pistons *P* and *P'* so arranged that one is up when the other is down. The pistons, having independent outlets, *O* and *O'*, develop their own alternating compression and rarefaction. When the air is compressed at *O*, it is rarefied at *O'*, and the degree of compression and rarefaction is regulated by screws *S* and *S'*.

By means of the catheterizing eustachioscope, a number four to number six kidney catheter, adopted for this purpose, is introduced into the eustachian tube as far as the isthmus. This catheter is much more flexible than those of hard rubber and yet not too soft for the purpose.

1. Pitman: New York State M. J. **27**:1061 (Oct. 1) 1927.

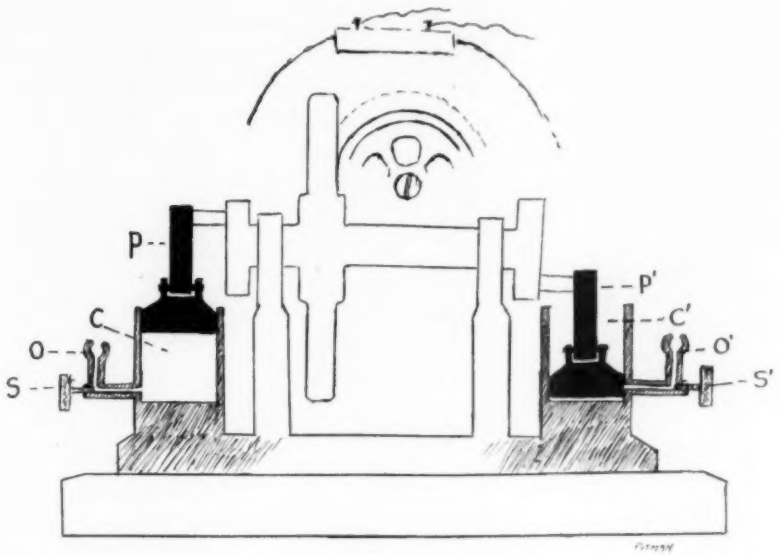

Fig. 2.—The pump is a two cylinder apparatus with pistons *P* and *P'* so arranged that when one is up the other is down.

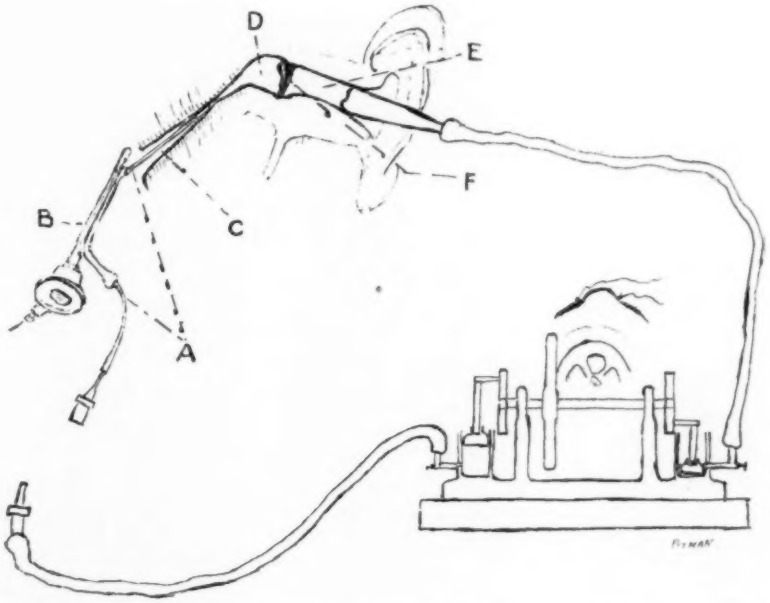

Fig. 3.—Schematic diagram of the apparatus when alternating compression and rarefaction of air is desired.

When it meets any resistance within the eustachian tube it bends on itself at the nasal orifice, visible through the nasopharyngoscope, warning the operator not to use too much force. The catheter has an outlet only at the end. It has millimeter markings at its forward end which show to what extent it has entered the eustachian tube before encountering obstruction.

At the outer end of the catheter a hypodermic needle is inserted (fig. 3). This needle must fit snugly, so that air does not escape. With a 2 cc. syringe, fumes collected from a bottle half filled with equal parts of ether and glacial acetic acid are injected slowly into the middle ear through the catheter. The aim is to break up adhesions and to hasten

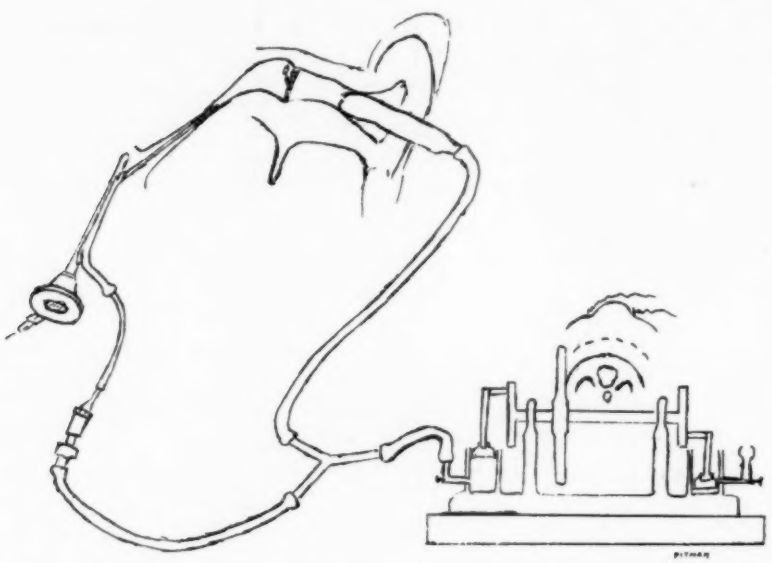

Fig. 4.—Schematic diagram of the apparatus showing how, with one cylinder and a Y-tube, equal compression and rarefaction of air on both sides of the drum is obtained.

evaporation (Brunner). The syringe is then replaced by a tube connected to outlet *O* of the pneumomassage pump. Another tube, having a rounded end, is attached to outlet *O'* and is introduced into the external canal of the same ear. The motor is then started and allowed to run for ten seconds, stopping for an equal length of time. This procedure is repeated five or six times. In this way, while the drum membrane is vibrated laterally, the ossicles are moved laterally by the alternate compression and rarefaction of air in the external auditory meatus, and anteroposteriorly by the alternate compression and rarefaction of air in the eustachian tube. The pressure should never exceed 3 pounds (1.4 Kg.).

Fig. 5.—Demonstration of the apparatus in use to obtain alternate compression and rarefaction of air.

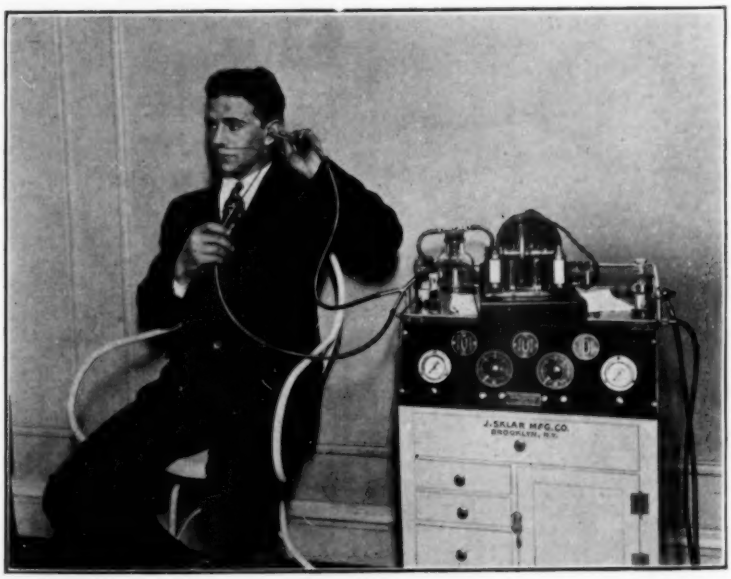

Fig. 6.—Demonstration of the apparatus in use to obtain equal compression and rarefaction of air on both sides of the ear drum.

The same apparatus may be employed when it is desired to prevent abnormal relaxations of the drum membrane. Pressure on the drum may be eliminated and still be exerted on the ossicles. In this case, only one cylinder of the pump is used, but with the help of a Y-tube, it is connected with both the eustachian tube and the external canal (fig. 4). Therefore, when the pump is going, there is compression and rarefaction to an equal degree on both sides of the drum, keeping it stationary. The ossicles, however, are subject to anteroposterior movement just as before, brought about as before, by the compression and rarefaction of air within the eustachian tube. This tends to break up ankylosis.

CONCLUSION

1. The four separate methods of treatment ordinarily used are combined in one, thus shortening the period of treatment and enhancing the effectiveness of each one.

2. The catheter, which acts likewise as a dilator, is introduced in the eustachian tube under direct vision, allowing the operator also to observe conditions at the nasal orifice of the eustachian tube.

3. The use of the kidney catheter obviates abrasions to the mucous membrane.

4. A method of avoiding abnormal relaxation of the drum membrane is described.

5. The method of treatment described here brings anteroposterior as well as lateral movement to the ossicles.

Clinical Notes

AN OPERATIVE PROCEDURE SUGGESTED FOR SINUS THROMBOSIS *

JACOB L. MAYBAUM, M.D., NEW YORK

Despite a notable advance in the surgical treatment of sinus thrombosis, a mortality of from 35 to 50 per cent is still commonly reported by otologists. In the past, late operative intervention could be assigned as an important factor accounting for this high death rate. Today, however, this reason is not tenable. Early diagnosis and operation is the rule. Incomplete operative intervention with resulting metastatic invasion, for one reason or another, undoubtedly contributes to the high mortality of sinus thrombosis.

Dr. Libman's [1] investigations on blood culture have been of tremendous importance in the knowledge of systemic infections of otitic origin. The recent differential blood culture studies of Dr. Ottenberg [2] have thrown new light on the modus operandi of systemic invasion in sinus thrombosis. A preponderance of bacteria obtained from one internal jugular vein as compared with the other is suggestive of the presence of a thrombus; in cases of bilateral mastoid disease, if the thrombus is obturating it is located on the side from which a lesser number of colonies is obtained. The systemic invasion is in large part through the torcular herophili end and the opposite side, and not the bulb end of the diseased sinus.

Giving thought to the practical application of Dr. Ottenberg's studies, it occurred to me that the prime necessity in every case of sinus thrombosis, irrespective of whether one suspects the presence of an obturating or mural thrombus, is to obliterate the lateral sinus on the diseased side, close to the torcular herophili, at an early stage of operative intervention. Two objects are to be attained for a successful handling of the surgical problems: first, to obliterate the main channels which conduct the systemic invasion, and, second, to deal with the local problem. In other words, an operation on the lateral sinus is not complete unless the torcular herophili end of the sinus is dealt with adequately; it is understood, of course, that the jugular vein is ligated at the start. Ordinarily, considerable time is consumed in disposing of the local problem before the important step in the operation is reached (occluding of the torcular herophili end of the sinus).

The steps in the approach to the lateral sinus, as usually taken, are as follows:

The diagnosis of sinus thrombosis having been made, the jugular vein is ligated (by some resected), the mastoid exenterated, the sigmoid sinus plate uncovered and the exposure carried back toward the torcular herophili until

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* Preliminary report from the Otological Department, Mount Sinai Hospital.

1. Libman, Emanuel: Tr. Am. Otol. Soc., 1906, part 2, p. 135; Ninth Internat. Otol. Cong., Boston, 1912.

2. Ottenberg, Reuben: Procedure Suggested For the Diagnosis of Sinus Thrombosis, Laryngoscope **37**:424 (June) 1927; The Diagnosis of Sinus Thrombosis: A New Procedure, Arch. Otolaryng. **5**:43 (Jan.) 1927.

apparently normal sinus is reached. The sinus is then incised. Because of the time thus far consumed before the torcular herophili end is dealt with, it may be necessary to stop the operation, owing to the poor condition of the patient, or to excessive bleeding from the sinus. Since the problem has not been dealt with adequately, recovery may follow a prolonged and stormy convalescence, with or without further intervention, or death may result from metastatic involvement of the meninges or other important organs, despite late attempts to control further systemic invasion.

ANATOMIC CONSIDERATION

The torcular herophili, or confluence of the sinuses, does not correspond exactly to the external occipital protuberance on the exterior of the skull. It is a little above and to the right of this protuberance, and is formed by the meeting of the longitudinal sinus from above, the lateral or transverse sinuses, the straight sinus from in front and the occipital sinus from below. The lateral sinuses pass from the torcular herophili toward each side in the tentorium between the cerebrum and cerebellum, following the superior curved line of the occiput until just above the upper posterior portion of the mastoid. In this course the sinuses rise above the level of a line drawn from the external occipital protuberance to the center of the external auditory meatus. As the superior longitudinal sinus passes backward to the torcular herophili and into the right lateral sinus, it inclines more to the right, so that at the torcular herophili the left side of the sinus is about in the median line. In 50 per cent of the cases the superior longitudinal sinus passes into the right lateral sinus, and the straight sinus into the left lateral sinus. In 30 per cent of cases the longitudinal and straight sinuses bifurcate, one branch of each passing to the lateral sinuses. In the remaining 20 per cent, the sinuses are fused at the torcular herophili.

The procedure outlined has been done by me repeatedly on the cadaver. An opportunity of following this technic in cases of sinus thrombosis has not yet presented itself.

PROCEDURE

The internal jugular vein having been ligated, the next step is to obliterate the lateral sinus close to the torcular herophili. The position of each lateral sinus is fairly constant for a distance of about 6 cm. from the external occipital protuberance. A 6 cm. vertical incision is made on the side of the diseased sinus, at about 5 cm. distance from the external occipital protuberance. In examining a considerable number of specimens, one observes that little difficulty need be experienced in locating the sinus by having the following landmark in mind. An imaginary line having been drawn from the external occipital protuberance to the glabella, the trephine is placed on this line at a distance of 4 cm. from the former point. The trephine opening is thus either directly over the sinus or sufficiently close, so that the sinus can be brought to view after the opening has been enlarged with a rongeur or Hudson bone forceps. A hand trephine is used to uncover the sinus; with ordinary care no danger is involved in the use of this instrument. Two conditions should be observed: 1. As soon as the trephine groove is fairly well marked, it should not be deepened before the trephine pin is withdrawn. 2. The interior half of the trephine groove is deepened to a greater degree than the posterior half. With a quick backward motion of the handle of the trephine (parallel to the course of the sinus), the button of bone is readily removed. If the latter procedure is followed, a lip of bone is left on the posterior rim of the trephine opening. The trephine, there-

fore, does not come in contact with the sinus at any time. The exposure thus made is enlarged sufficiently to permit the bringing to view of the upper and lower margins of the sinus, and also extended forward to allow for the insertion of a plug.

If the condition of the patient is poor, this step in the operation can be done under local anesthesia. A mastoidectomy is then rapidly performed, mainly, at this time, with the idea of uncovering the sigmoid sinus. The exposure of the transverse sinus is performed either in the usual way of proceeding from the angle of the sinus backward, or by proceeding from the trephine opening forward. By uncovering the region of the angle of the sinus last, the danger of injuring the sinus at this point before complete exposure of it, with resulting bleeding from a superior petrosal sinus, is lessened. I prefer not to remove the small piece of bone in relation to the superior petrosal sinus. The sinus is incised in the usual manner.

Tobey,[3] some time ago, casually referred to a procedure in which he occasionally trephined the cortex over the lateral sinus. He did not state that this procedure was done by him as a preliminary step, that is, before he exenterated the mastoid. He did not mention the necessity for trephining the sinus close to the torcular herophili on the diseased side with the purpose of occluding the sinus at this location and thus minimizing the likelihood of systemic invasion. Surgeons who perform cranial operations not infrequently have occasion to trephine the cortex over the lateral or other cranial sinuses. As further proofs of Ottenberg's conclusions regarding the important pathways of systemic invasion in sinus thrombosis are obtained, the procedure described may become of definite value in the surgical attack on the lateral sinus.

Only in exceptional instances have I found it necessary to uncover the sigmoid sinus first, to confirm the diagnosis of sinus thrombosis. Almost invariably the diagnosis of sinus thrombosis is made before operating, and, therefore, the jugular vein is ligated in advance. If doubt exists as to the diagnosis, the sigmoid sinus may be rapidly uncovered and inspected as a preliminary step; the remainder of the operation should proceed along the lines previously indicated.

Time will determine whether the procedure proposed will be advised in all cases of sinus thrombosis, or those in which there is found a preponderance of bacteria from the jugular vein on the healthy side, or will be reserved for those cases in which the primary operation has not adequately controlled the systemic invasion.

CONCLUSIONS

1. The differential blood culture studies of Dr. Ottenberg have thrown new light on the modus operandi of systemic invasion in sinus thrombosis.

2. Despite earlier intervention and improved surgical procedure for sinus thrombosis, the mortality is still high.

3. An operative procedure is proposed in which the torcular herophili end of the lateral sinus is occluded early in the operative approach before a mastoidectomy is done.

4. In thrombosis of the jugular bulb, an operation should be performed on the bulb only if there is a continuance of bacteremia and symptoms, after the main channels have been occluded.

12 East Eighty-Sixth Street.

3. Tobey, G. L.: Lateral Sinus Thrombosis, Tr. Am. Otol. Soc., 1919.

A NEW RHINOPLASTIC INSTRUMENT

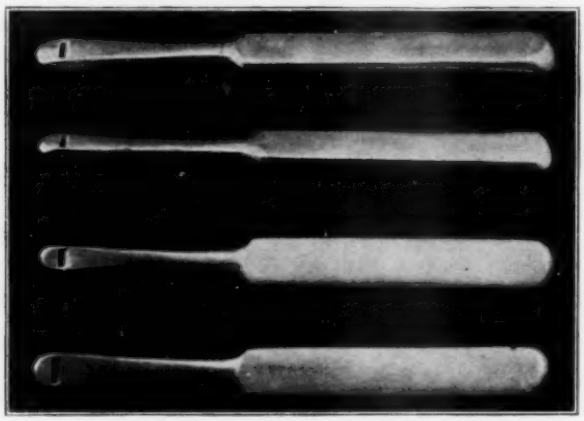
JOSEPH SAFIAN, M.D., NEW YORK

For a long time a want has been felt for an instrument that could safely be used for the removal of bony irregularities along the dorsum of the nose.

The usual nasal hump is best removed by the bayonet-shaped saw devised by Joseph of Berlin. But the small sharp points or edges which frequently appear on the nose following fracture of the nasal bones or the small hump which the patient wishes removed cannot be smoothed off with a saw blade. The usual procedure in such cases is to use a chisel.

The ordinary chisel is a dangerous instrument to use in rhinoplastic operations. It is likely to cut deeper than the surgeon intends, or it may cause the bone to split in an unexpected direction.

To overcome this difficulty, I have devised the osteoplastic plane, which operates on the principle of the carpenter's plane. It is made in two thicknesses,



Osteoplastic Plane.

permitting the shaving off of from 1 to 2 mm. of bone with each movement of the instrument. The cutting edge cannot cut in a downward direction, being protected by a smooth projection in front which limits the thickness of the shaving. Since nasal humps vary in width, the instrument is made in two sizes: one narrow and one somewhat wider.

This instrument may be used in two ways, either as a plane held firmly in the operator's hand and pushed forward with powerful strokes, or as a chisel, with light tappings with a wooden mallet against the end of the handle.

I believe this instrument fills a definite requirement in the correction of small nasal humps or other small bony protuberances which cannot be properly taken care of by any instrument in use at present.

I wish to express my appreciation to Pfau's American Instrument Company of New York for their cooperation in developing this instrument.

574 West End Avenue.

THE DEGREE OF MALIGNANCY OF CARCINOMA OF THE ESOPHAGUS*

ALBERT C. BRODERS, M.D., AND PORTER P. VINSON, M.D.
ROCHESTER, MINN.

The conception that carcinoma of the esophagus is a slow-growing tumor of a low degree of malignancy and with little tendency to metastasize has prevailed in almost all writings on the subject to the present time. A notable exception to this has been made by Souttar,[1] who has described esophageal carcinoma as highly malignant.

When one considers that the present mortality rate in carcinoma of the esophagus is almost 100 per cent, it seems likely that failure to cure the disease has been due to the type of the growth more than to the method of treatment. We believe that the prevailing impression that the disease represents a low degree of malignancy, that metastasis is infrequent, and that early diagnosis and the perfection of surgical technic will result in complete removal of the growth without subsequent recurrence in a reasonable number of cases is erroneous. In support of this, we have studied histologically the tissue removed from esophageal carcinoma in 207 cases. Sections were removed from the esophagus during life in 178 of these cases, and post mortem in 29 cases.

In a previous study of 880 cases of general epithelioma, it has been shown that the greater the degree of cellular differentiation, the more hopeful the prognosis.[2] In the study, the tumors were divided into four groups. In the first group, 82 cases graded 1 (9.31 per cent), differentiation or self-control of the tumors varied from almost 100 to 75 per cent, and undifferentiation from 0 to 25 per cent; in the second group, 407 cases graded 2 (46.25 per cent), the differentiation or self-control varied from 75 to 50 per cent and undifferentiation from 25 to 50 per cent; in the third group, 282 cases graded 3 (32.04 per cent), the differentiation varied from 50 to 25 per cent and undifferentiation from 50 to 75 per cent; and in the fourth group, 109 cases graded 4 (12.38 per cent), differentiation or self-control varied from 25 to practically 0 per cent and undifferentiation from 75 to about 100 per cent.

In the first group, good results were obtained from treatment in 90.2 per cent; in the second group, good results were obtained in 62.16 per cent; in the third group, the results of treatment were good in 24.82 per cent, and in the fourth group, the results were good in only 10.09 per cent. Treatment was essentially the same in all cases. This demonstrated clearly that the degree of malignancy and not the type of treatment was the determining factor in the results obtained.

With this study as a basis, we classified esophageal carcinoma and found that in none of the 207 cases was the malignancy graded 1. In 16 (7.73 per cent), it was graded 2; in 95 (45.90 per cent), it was graded 3, and in 96 (46.37 per cent), it was graded 4.

It is therefore apparent that, on the basis of our method of investigation, esophageal carcinoma is a tumor of a high degree of malignancy with marked cellular activity and little tendency to cell differentiation or self-control.

Further study revealed that in forty-two postmortem examinations in cases of esophageal carcinoma, there was extension to other organs or local or general

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* From the Section on Surgical Pathology and the Division of Medicine, Mayo Clinic.

1. Souttar, H. S.: Treatment of Carcinoma of the Esophagus; Based on 100 Personal Cases and Eighteen Postmortem Reports, Brit. J. Surg. **15**:76, 1927.

2. Broders, A. C.: The Grading of Carcinoma, Minnesota Med. **8**:726, 1925.

metastasis in twenty-seven; this occurred in fourteen of the last fifteen examined. The average duration of symptoms in these cases is seven months before examination at the clinic. In the group in which postmortem examination was performed, the average duration of symptoms was eight months. In those in which metastasis or extension occurred, the symptoms had been present for an average of nine months. Therefore, it cannot be concluded that the deaths in the clinic represent the end-results in cases of a prolonged malignant growth, but rather the average cases at the time medical examination is made.

Eight deaths followed dilatation of the malignant stricture, and ten occurred following attempts at surgical removal or gastrostomy. The remaining deaths were due to spontaneous perforation, hemorrhage and inanition.

It would appear that carcinoma of the esophagus will continue to be a rather hopeless problem until such time as a systemic treatment for carcinoma can be found. The duration of the growth before symptoms occur, the inacessibility of the lesion, the advanced age of the patient and his poor general condition are sufficient in themselves to make surgical treatment seem futile. When, in addition to this, one knows that metastasis is commonly a complication, and that the growth is highly malignant, the prospect for complete and permanent surgical removal is indeed gloomy.

Progress in Otolaryngology

A Summary of the Bibliographic Material Available in the Field of Otolaryngology

THE PARANASAL CAVITIES

A REVIEW OF THE LITERATURE OF 1927

D. CAMPBELL SMYTH, M.D.

BOSTON

ANATOMY AND EMBRYOLOGY

Thacker-Neville [1] reported an anomaly of the sinuses; the patient had a double antrum on both sides. Transillumination showed both antrums to be dark, and yet the washings were negative. A radical operation on the antrum disclosed complete median partitions in both antrums. The outer cavity on each side contained polypi.

In an article on the sphenoid, Klepper [2] refers to seven different types of anomalies, both as to the development and as to the size of the sinuses.

PATHOLOGY

Finck [3] reported the results of his work on tissue changes in the nasal mucosa. This work extended over a period of seven years and was done thoroughly under the guidance of Dr. Mosher and Dr. Verhoeff. A study was made of the mucous membranes of the nose in acute nasal congestions, acute and chronic purulent rhinitis, vasomotor rhinitis, nasal polypi, cystic polypoid formations, fibrous polypoid formations and atrophic conditions of the nasal mucosa. The author suggests the term "physiological inflammation" as a useful one to describe a great variety of states of the mucosa (from a microscopic standpoint) in which a resting or average nasal mucous membrane of human beings is found to occur. The degree of this physiologic inflammation found is an index of the susceptibility of the patient to develop abnormal nasal states or disorders. There are several distinct types of physiologic inflammation characterized by definite changes in the amount or number of certain tissue elements. The clinical signs and symptoms exhibited by the patient can usually be surmised from these definite microscopic pictures. In the majority of tissue changes, the significant cells are the lymphocytes, plasma cells and eosinophils, the latter being strikingly abundant in conditions that are commonly considered as purely vasomotor and anaphylactic. When a mixture of purulent secretion is not

1. Thacker-Neville, W. S.: Brit. M. J. **1**:277, 1927.
2. Klepper: Laryngoscope **37**:742, 745, 1927.
3. Finck: Tr. Am. Laryngol. Rhinol. & Otol. Soc., 1927, p. 63.

obvious, Finck suggests that the development of an increasing physiologic inflammation is a definite index of lowered resistance in the patient. He finds also that abnormal states such as congestion with sneezing and watery discharge, polyps, polypoid and cystic formations can occur independent of any noticeable bacterial influence. He believes that in many people proper functioning of the nasal mucosa is altered by reflexes sent to it from another organ in the body which is abnormally stimulated, as, for example, from the skin, which is sensitive to or which has a lowered threshold to changes in temperature. He places bacteria in a secondary rôle in the etiology of abnormal states. The "preparing of the soil" seems to be necessary for them just as it must be for proteins or chemicals before they can become pathogenically active.

Shea [4] reviewed the normal and pathologic development of the sinuses, quoting chiefly from Davis. He made a study of their development by a series of x-ray examinations and noted that the floor of the antrum is at first above the floor of the nose, while in the adult type the floor of the antrum gets below the level of the nasal floor. He claims that development of the sinuses is not interfered with by operations, but, on the contrary, an operation is helpful to their full development when infection is present. "If the infection of the sinus is arrested and this is best done by removal of the tonsils and adenoids and if necessary the drainage of the antrum, the sinuses will begin to grow. In fact, unless the development of the sinus is accomplished to within the range of the normal age of the patient, the infection cannot be considered cured."

Naftzer,[5] in a paper on infections of the maxillary sinuses, stated that in speciments of mucous membranes that have been examined from the antrums, he found in the acute form a high grade of infection present; the cells consist of lymphocytes and polymorphonuclear leukocytes; the blood vessels are enlarged and extravasations of blood occur. In the chronic suppurative cases, there is a high grade infiltration consisting chiefly of lymphocytes and polymorphonuclear leukocytes, and the deeper layers of mucous membrane are involved. On the surface there is an exudate consisting chiefly of desquamated epithelium, the cells being flattened and not showing normal cilia.

PHYSIOLOGY AND BACTERIOLOGY

Simin,[6] in a preliminary communication of the defensive qualities of the nasal mucous membrane, said that in spite of the fact that the nasal cavity is rich with micro-organisms some of which are virulent,

4. Shea, J. J.: New Orleans M. & S. J. **79**:523, 1927.
5. Naftzer, J. B.: J. Iowa M. Soc. **17**:401, 1927.
6. Simin, A.: Ztschr. f. Hals-, Nasen- u. Ohrenh. **16**:478 (Oct. 14) 1926.

complications rarely follow operations, the nasal cavity practically freeing itself from these organisms. He introduced into the nose of a rabbit from 3 to 5 drops of a twenty-four hour bouillon culture of *Bacillus prodigiosus*. At certain intervals, specimens were procured and planted on agar agar. In about fifteen hours, rarely a little longer, the nose was free from the organisms. In exceptional cases only could cultures be grown after twenty-four hours. When 5 drops of physiologic salt solution were repeatedly instilled in one side of the nose, the organisms grew in greater numbers on cultures from that side of the nose than on those from the other side which had not been thus treated. The micro-organisms also lived longer in the side of the nose treated with the saline solutions. Almost the same results were obtained by the introduction of 3 or 4 drops of a 1 : 10,000 solution of epinephrine chloride or a 5 per cent solution of cocaine with epinephrine. Entirely different results were obtained with from a 5 to 10 per cent solution of silver nitrate. This solution was applied twelve hours before the introduction of the micro-organisms and created a severe coryza. The specimens taken from the side of the nose treated showed fewer colonies than the other, and the colonies disappeared sooner.

The experiments were continued by Gluchowa on rabbits exposed to low temperatures, hunger and alcohol. These experiments have not yet been concluded, but they show in general that the nasal mucous membranes are influenced unfavorably. He is also endeavoring to determine the number of phagocytic cells in the mucus of the nose.

BENIGN TUMORS

The usual number of mucoceles and osteomas involving the sinuses have been reported. The possibilities of the extent of invasion of the former are, of course, so great that many of them make interesting cases to report. Not much work, however, has been forthcoming concerning their etiology.

Rossier [7] advocates the endonasal route for mucoceles of the anterior ethmoidal region and the external route for those of the posterior region. He considers that either route may be used for those originating in the frontal sinus, depending on the size of the cavity and the ease with which the mucocele can be reached.

Garretson,[8] Daily,[9] Canuyt,[10] and Gignoux and Arcelin [11] reported interesting cases of mucoceles, while osteomas have been reported by

7. Rossier: Ann. d. mal. de l'oreille, du larynx. **46**:49, 1927.
8. Garretson, W. T.: Laryngoscope **37**:350, 1927.
9. Daily, L.: Ann. Otol. Rhin. & Laryng. **35**:834, 1926-1927.
10. Canuyt, G.: Bull. Soc. d'opht. de Paris, 1927, p. 293.
11. Gignoux and Arcelin: Lyon. méd. **139**:96, 1927.

Garretson,[12] Mouret and Dejean,[13] the former reporting three cases. Some of these writers speak of the rarity of mucoceles and refer to the literature to substantiate them in this view. Mucoceles, however, are not nearly so rare as the literature would lead one to suppose, as a great many cases are seen in some of the larger special hospitals in the regular routine work and are not reported, and about the same holds true for osteomas.

Lobell,[14] in reporting a cyst of the maxillary sinus, discussed the relationship of cysts and mucoceles. He said:

> The clinical and pathological features of mucoceles are indisputable. It is doubtful if occlusion of the ostium is the only factor in their production. It is not unlikely that some type of cystic degeneration of the mucosa precedes the mature and classic mucocele. It must have a favorable soil for its origin. According to this conception both factors, cystic degeneration and ostium occlusion, are necessary to the development of the mucocele. A cyst may grow until it fills the capacity of a sinus without producing a mucocele as long as the ostium remains patent. Similarly occluding of the ostium without a tendency to cystic degeneration of the mucosa will not cause a genuine mucocele.

Cushing [15] also reported four cases of osteomas with intracranial complications. Two of the patients died, and, according to the author, death was due to a lack of knowledge concerning the relation of the osteoma to the intracranial symptoms. One patient died from infection due to failure to close off the communication between the meninges and the nasal cavity at the conclusion of the operation, and the other died as a result of surgical procrastination. In the author's opinion it is best to remove the ethmoidal osteoma as soon as it is revealed by the x-ray. He stated that it should be recognized early by the rhinologist before the secondary symptoms cause the patient to be sent to an ophthalmologist or to a general surgeon on account of the eye or intracranial complications.

MALIGNANT DISEASES OF THE SINUSES

White [16] reported two cases of malignant disease of the sphenoid with ocular disturbances. These patients were observed in the study of 125 cases. Both died of meningitis.

Sherrill,[17] viewing malignant disease of the sinuses from the general surgeon's standpoint, favored complete surgical removal when it may be

12. Garretson, W. T.: Osteoma of Frontal, Maxillary and Sphenoid Sinuses, Arch. Otolaryng. **5**:135 (Feb.) 1927.

13. Mouret and Dejean: Rev. d'oto-neuro-ocul. **5**:138, 1927.

14. Lobell, A.: Relationship Between Mucoceles and Cysts, Arch. Otolaryng. **6**:546 (Dec.) 1927.

15. Cushing, H.: Surg. Gynec. Obst. **44**:721, 1927.

16. White, L. E.: Disturbance of Optic Nerve Caused by Malignant Disease of Sphenoid, Arch. Otolaryng. **6**:361 (Oct.) 1927.

17. Sherrill, J. G.: Kentucky M. J. **25**:506, 1927.

safely accomplished. It should be complete in every case. He stated that while some of the radiologic reports are encouraging, a decision between the relative merits of the two procedures cannot be made from the present knowledge of the subject. Complete accord between the surgeon, the radiologist and the rhinologist will produce results.

Progress made in the knowledge concerning malignant conditions of the antrum was reviewed by Thompson,[18] and an up-to-date bibliography on the subject appeared with the article.

Barnes [19] advocates the wide open operation in cases of malignant disease of the sinuses followed by immediate irradiation. His operative mortality and results are remarkable when one considers that he does not select his cases but operates almost regardless of the stage of the disease. In the twenty-five cases reported by him, four of the patients died as a direct result of the operation—two of operative shock and the other two of meningitis. Of seventeen patients with carcinoma, seven are well (41 per cent) and without evidence of recurrence after ten months, fourteen months, fifteen months, four years, five and one-half years, eight years and nine years, respectively. Of the other eight patients with sarcoma, five are well (75 per cent) and without evidence of recurrence after periods of thirteen months, four years, six years, eight and eight and one-half years, respectively, while one patient was well and without evidence of recurrence at the time of his death by accident three years after the operation. Barnes' results have been successful in thirteen cases (52 per cent). Two of the patients had a good local result but died of distant metastasis. The author advises leaving the facial opening in these cases patent for three years, a period which he feels is a fairly safe limit for local recurrences. He believes, however, that plastic closure may be performed with comparative safety after one year of absolute freedom from local recurrence. Seguar and Zebizarreta [20] reported a case of osteitis fibrosa occurring in a patient, aged 36, who at the age of 17 complained of nasal stenosis, at which time a double turbinectomy was performed. Gradually the root of the nose, left maxilla and the orbital wall became involved, and when seen by the authors, the deformity was marked. Examination showed a dense tumor obstructing the left side of the nose. A Moure operation was performed, with radical extirpation of the tumor. The postoperative results were satisfactory. The authors are of the opinion that extremely radical surgical intervention is imperative, but that in the generalized form of the disease only palliative measures are of value. The literature on the etiology and pathology of the disease is reviewed in detail.

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18. Thompson, G. H.: Ann. Otol. Rhin. & Laryng. **36**:715, 1927.

19. Barnes, H. A.: Arch. Otolaryng. **6**:123 (Aug.) 1927.

20. Seguar, E. V., and Zebizarreta, H.: Arch. internat. de laryngol. otol. rhinol. **6**:816 (July-Aug.) 1927.

FRONTAL SINUS

Atkins [21] reviewed the indications for radical operation on the sinus and reported forty-two cases of his own in which the Killian technic, having as its object obliteration of the sinus, was used.

Gill [22] described his own technic for an operation on the sinus. He modifies the Killian operation, as he does not disturb the lacrimal sac or the attachment of the superior oblique muscle. He does not expose or remove the whole floor of the sinus but only enough of it to admit a rubber tube about one fourth inch in diameter. An opening of similar size is made through the lower edge of the nasal bone and the upper edge of the lacrimal bone. Rubber tubing is then introduced and left in position for one week, and a pressure bandage is worn until the sinus is obliterated. It is difficult to see how this type of operation can possibly be successful in any but the most favorable cases.

Lillie and Anderson [23] recommend what they call a two-stage operation for chronic suppurative frontal sinusitis. They perform the intranasal work on the ethmoid first, this work being done under local anesthesia. If the condition in the frontal sinus does not clear up, an external operation is performed a week or so later. The authors have been surprised at the number of cases in which the condition cleared up without requiring the second stage operation. It is gratifying to find that a great many rhinologists are beginning to observe that many infections of the frontal sinus can be cured by proper intranasal surgical treatment of the anterior ethmoidal region. Certainly, practically all patients with subacute and acute conditions can be treated in this way, and also a fairly large proportion of those of the chronic suppurative type.

Spielberg [24] described the technic of an intranasal ethmoid and frontal operation, which is essentially that of Halle. He reported a series of twenty cases in which operation was performed by this method with good results. It is difficult to understand how any frontal operation which includes in its technic rasping of the nasofrontal duct and postoperatively a metal cannula in the duct can give good results. One conclusion of the writer, however, must be entirely agreed with, namely, that the majority of patients with disease of the frontal sinuses get well by intranasal work alone, and this should always be done first. This intranasal work, however, should not include rasping of the nasofrontal duct if there is a patent probable duct with which to begin.

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21. Atkins, R. T.: New York State J. Med. **27**:12, 1927.

22. Gill, E. G.: South M. J. **20**:612, 1927.

23. Lillie, H. I., and Anderson, C. M.: Two-Stage Operation for Suppurative Frontal Sinusitis with External Manifestations, Arch. Otolaryng. **5**:152 (Feb.) 1927.

24. Spielberg, W.: Laryngoscope **37**:79, 1927.

Teachenor [25] reported a number of deaths due to fracture involving the sinuses, especially the frontal sinuses. He emphasized the necessity for early diagnosis and drainage of the affected cavity if the patient is to be saved. In cases of cerebrospinal rhinorrhea or pneumocephalus, the dural lacerations should be located and closed.

Wright [26] reported a case of ascending infection from the antrum to the frontal sinus, which was due to a rhinolith in the former. The nucleus of the rhinolith was the apex of the root of a molar tooth, the tooth itself having been removed many years before. An operation on the frontal sinus and also an intranasal antrum operation was performed. The patient finally blew the rhinolith out of his nose and cured himself.

SPHENOID SINUS

Schachter [27] reported six cases of chronic sphenoid infection. All the patients complained of severe headache, the origin of which was obscure until the presence of sphenoiditis was discovered. Rapid, permanent and complete relief followed operation.

In a paper on spheno-ethmoiditis, MacGibbon [28] brought out the fact that this condition is common in sections of Australia, stating that 50 per cent of the children of Christchurch have infection of the ethmoid and sphenoid.

In a paper on acute sphenoiditis, Mithoefer [29] pointed out that many cases are overlooked and that an examination of the paranasal sinuses is never complete without giving the sphenoid the attention it requires. He himself had seen thirty cases of acute sphenoiditis during the previous winter. Of these, twenty-four patients suffered with headache and fourteen had mental depression. The antrum and anterior ethmoid were affected in all of the cases and the middle ear in eight cases. Three of the patients had severe otalgia without involvement of the ear, two had vertigo, and two had asthma. Eleven gave a history of having recurring nasal infections. In one patient with vertigo, treatment of the sphenoid gave immediate relief. He also lays stress on the many etiologic factors, namely, deviated septum, enlarged turbinates, small or misplaced ostia, edema of the mucous membranes and others which cause insufficient drainage of the sinuses.

Finot [30] cited three cases of simulated mastoiditis in which the patients were relieved by sphenoid drainage.

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25. Teachenor, F. R.: Intracranial Complications of Fracture of Skull Involving Frontal Sinus, J. A. M. A. **88**:987 (March 26) 1927.
26. Wright, A. J.: J. Laryng. & Otol. **42**:192, 1927.
27. Schachter: M. J. & Rec. **126**:236, 1927.
28. MacGibbon, T. A.: M. J. Australia **2**:274, 1927.
29. Mithoefer, W.: Ohio State M. J. **23**:296, 1927.
30. Finot, P. H.: U. S. Vet. Bur. M. Bull. **3**:472, 1927.

Ferreri [31] relieved a patient who had pituitary disturbance by opening and draining the sinus.

Dupuy [32] considers that the most accurate way of measuring the intranasal distance to the sphenoid is by means of x-ray plates.

Among other articles appearing on symptoms, etiology and diagnosis of diseases of these sinuses are those by Tomlin,[33] Watson-Williams [34] and Loebell.[35]

ETHMOID SINUS

Sansum [36] made a study of 109 cases of ethmoidal and sphenoidal disease showing conditions which could be attributed to focal infection. Of these cases, twenty-nine were sphenoidal, twenty-four ethmoidal, thirty-eight frontal and seventeen maxillary.

A case of pneumococcus septicemia following removal of the middle turbinate during an acute sinusitis was reported by Hart.[37] The patient died in spite of all treatment including transfusion, intravenous injection of gentian violet solution, and pneumococcus serum.

Alden [38] reported a case of cerebrospinal fistula following removal of part of a middle turbinate for acute ethmoiditis. After the patient was dehydrated enough to reduce the intracranial pressure, the fistula healed, and recovery occurred.

A great many other articles on this sinus have appeared during the last year, none of which contained anything essentially new.

MAXILLARY SINUS

Emerson [39] accepts the pathology of this sinus as worked out by Dean and Dmschowsky and attempts to make a clinical classification of maxillary sinus disease based on the pathologic processes. He also attempts to predict clinically the dangerous cases and the pathologic changes that justify such a conclusion. He stated that chronic catarrhal sinusitis is of importance because it leaves a thickened membrane which interferes with drainage, and if a hypertrophic rhinitis is present, there is a suitable field for a suppurative condition of the sinus. He divides chronic maxillary sinusitis into three classes: (1) those showing a thickened membrane and free pus, (2) those in which the membrane is

31. Ferreri, G.: Riv. oto-neuro-oftal. **4**:21, 1927.
32. Dupuy, H.: South. M. J. **20**:536, 1927.
33. Tomlin, W. S.: Eye, Ear, Nose & Throat Month. **6**:516, 1927.
34. Watson-Williams, P.: Strasbourg-med. **85**:208, 1927.
35. Loebell, H.: Ztschr. f. Laryngol. Rhinol. **15**:174, 1927.
36. Sansum, W. D.: Radiology **9**:410, 1927.
37. Hart, V. K.: South. M. J. **20**:249, 1927.
38. Alden, A. M.: Ann. Otol. Rhin. & Laryng. **36**:121, 1927.
39. Emerson, F. P.: Ann. Otol. Rhin. & Laryng. **36**:947, 1927.

thickened without pus and (3) those in which the lining membrane is undergoing a retrograde or degenerative process and in which the secretion is serous or gelatinous. In the first class the lining is usually involved superficially, while in the second and third classes are the dangerous cases in which the periosteum is involved.

Bass [40] reported a case of spontaneous hemorrhage from the antrum. The hemorrhage was persistent and was finally controlled by filling the cavity of the sinus with thromboplastin.

A study of 230 cases of chronic disease of the maxillary antrum was made by Mercer,[41] who concluded that in the majority of cases of suppuration of the antrum the patients can be cured by an operation on the naso-antral wall; he advocates the use of a tube for drainage and irrigation. From his records, a large proportion of the cases of disease of the antrum are not secondary to disease of other sinuses or of the teeth. Simple drainage and aeration were effective in from 85 to 94 per cent of all his cases. He does not believe that disease of the maxillary sinus has much to do with asthma but may be a causative factor in bronchitis.

Lockard and Argall [42] called attention to the fact that latent disease of the antrum is a frequent condition, and that its rôle in secondary infections is equal to that of the tonsils and teeth. In the majority of cases, the symptoms are focal rather than local. They believe it is a most potent factor in disease of the lower respiratory tract.

A study of 300 cases of maxillary sinusitis was made by Johnson.[43] In 127 of his cases, clinical and x-ray observations were positive. Results of examination of the sinus were positive in all but 3 of the 127 cases. Of these three, one showed negative results on operation; the ethmoid was involved in one and the frontal sinus, in two. There were twenty-three cases with positive clinical and negative x-ray evidence. In seventeen of these patients, the sinus contained thick mucus or mucopurulent clots and in three, pus. The cases with positive x-ray evidence and negative clinical observations are probably the most difficult in which to make a diagnosis of sinus infection.

Ninety such cases were seen, and a diagnostic puncture was made as a result of the x-ray observations alone. The sinuses were proved positive in only fifteen of these cases, which included seven of cystic sinus and two in which it was possible to observe the nose only once

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40. Bass, A. L.: Kentucky M. J. **25**:552, 1927.

41. Mercer, R. E.: Ann. Otol. Rhin. & Laryng. **36**:81, 1927.

42. Lockard, L. B., and Argall, A. J.: Colorado Med. **24**:3, 1927; Radiol. Rev. **4**:61, 1927.

43. Johnson, H. P.: Diagnosis of Chronic Maxillary Sinusitis, Arch. Otolaryng. **5**:309 (April) 1927.

before an exploratory puncture, so that a careful diagnosis was not made clinically.

A diagnostic puncture was made in sixty cases in which the clinical observations were negative and the x-ray pictures were also negative. All but one of these sinuses were proved to be normal. This one was cystic and contained a little bloody fluid. There were eight cases in which a cystic sinus was revealed by puncture. In seven of these the x-ray pictures had been positive, and all of them had been normal as far as clinical observation could go. Ninety-two per cent of the cases in this author's series could be diagnosed by clinical data alone. In sixty-seven of the cases, a diagnosis might have been made by the x-ray observations, while 98 per cent were diagnosed from the clinical and x-ray observations combined. As evidence in diagnosis, negative x-rays were found to be 10 per cent more reliable than positive ones. Eighty-seven per cent of the cases of cystic maxillary sinus were diagnosed by the x-ray, while none of these cases could be diagnosed by clinical observation. Nineteen per cent of the diseased maxillary sinuses could be traced to dental infection. The author states that interpretation of the "x-ray is of most value when made by the rhinologist who is familiar with the clinical observations in the particular case." This, I believe, probably accounts for the evident discrepancy in usefulness of the x-ray in his cases, for I am convinced that interpretation of x-rays of the sinus is a field in itself, and should be made only by a roentgenologist who is familiar with the patient's history and all other data. The usefulness of the x-ray in disease of the sinus is a variable factor, depending on the roentgenologist entirely, those connected with a special hospital having a decided advantage as they have the opportunity of daily following up clinical observations to check up their interpretations. After working for a number of years with a roentgenologist of this type, one becomes convinced that the x-ray is absolutely infallible in the diagnosis of disease of the sinus.

Israel [44] stated that maxillary sinusitis is not curable without a radical operation which is directed to the removal of all the pathologic processes present, and he believes that the Denker operation is the one of choice. He also stated that local anesthesia is much to be preferred in these cases. No proof of these assertions, however, is advanced in his paper.

Heitger [45] believes that the maxillary sinus is the most frequently involved of all the sinuses and also that polypi in the meati have the same relation to chronic catarrhal disease of the sinuses emptying therein as the presence of pus on these areas have to suppurative sinusitis.

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44. Israel, S.: Texas State J. Med. **22**:626, 1927.

45. Heitger, J. D.: South. M. J. **20**:618, 1927.

The following have had new instruments designed for operation on the naso-antral wall or drainage: Hourn,[46] Woodward,[47] Mandelbaum,[48] Schwartz,[49] Reaves,[50] Pearlman [51] and Daugherty.[52]

ACCESSORY SINUSES IN GENERAL

Hays [53] advocates local application of vaccines in the treatment of patients with subacute and chronic nasal sinusitis.

A case of infection of the maxillary sinus due to the fusiform bacillus and spirillum was reported by Jay.[54]

Myerson,[55] Jervey [56] and Skillern [57] sounded warnings of conservatism in the ethmoidal operation, emphasizing the necessity of accurate diagnosis and the necessity of skill and judgment on the part of the surgeon.

In a paper on differentiation between ophthalmic and sinus headaches, Fenton [58] stated that the history of the case is of great importance, the family tendency, recurrence, exposure (weather, occupation and irritants) and amount and kind of use of the eyes and other factors being noted. Based on the history, one looks for nasal obstruction to drainage (injuries, malformations, inflammation, edema, neoplasms and other symptoms), ocular interference with lymphatic drainage (corneal and iridociliary), inflammations (foreign bodies), increase of tension, edema (allergic, toxic), changes in the media, the retina and the nerve, and muscular insufficiencies.

He emphasizes that one must not forget that ocular and sinus headaches may exist at the same time in the same patient, nor should one forget the important rôle played by degenerative general disorders in building small amounts of ocular deterioration or nasal stasis into a relatively serious complication.

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46. Hourn, G. E.: Two Instruments for Resection of Antrum Windows, Arch. Otolaryng. **6**:572 (Dec.) 1927.
47. Woodward, F. D.: New Antrum Trocar and Antrum Rasp, Arch. Otolaryng. **6**:59 (July) 1927.
48. Mandelbaum, M. J.: Laryngoscope **37**:108, 1927.
49. Schwartz, E. M.: Laryngoscope **37**:380, 1927.
50. Reaves, R. G.: Arch. Otolaryng. **5**:351 (April) 1927.
51. Pearlman, L. M.: Artery Clamp as Better Antrum Punch, J. A. M. A. **88**:723 (March 5) 1927.
52. Daugherty, L. E.: New Antrum Needle, Arch. Otolaryng. **5**:514 (June) 1927.
53. Hays: Laryngoscope **36**:565, 1926.
54. Jay: M. J. Australia **2**:513, 1927.
55. Myerson, M. C.: Some Phases of Accessory Sinus Disease, Arch. Otolaryng. **6**:217 (Sept.) 1927.
56. Jervey, J. W.: Virginia M. Monthly **54**:293, 1927.
57. Skillern, R. H.: Ann. Otol. Rhin. & Laryng. **36**:925, 1927.
58. Fenton, R. A.: Ann. Otol. Rhin. & Laryng. **36**:1000, 1927.

Miller [59] reported several cases of disease of the sinus in which there was coincident cardiac trouble.

Merkel [60] advises the use of ephedrine in nasal diseases, especially those of sinus origin.

Many other writers are also advocating the use of this drug, and undoubtedly it is of some value when its use is indicated.

Hollender and Cottle [61] advocate the use of the radiant heat light in acute sinusitis and also the use of indirect diathermy over the affected sinus. They state that with this treatment the use of drugs is frequently unnecessary. In subacute and chronic sinusitis, they find that direct diathermy gives a most satisfactory result. They consider that intranasal galvanism and ultraviolet energy from the water cooled lamps are also important and valuable physical adjuncts.

Hasty [62] called attention to the severity of the sinus infections resulting from swimming which usually affect the frontal and ethmoid sinuses. The high percentage of the infections of the frontal and ethmoid sinuses is due, he believes, to virulent bacteria reaching the vulnerable part of the nose and to a lowered local or systemic resistance. An overdose of foreign bacteria of marked virulence for which the person does not have a previous immunity is an explanation that probably holds true, especially in children.

Harris and Simpson [63] described their technic, which is an excellent one for operation on the accessory sinuses under local anesthesia.

Harkness,[64] in an article on disease of the sinuses in private practice, stated that scar tissue takes the place of the lining mucous membrane of the antrum which has been removed, and he gave this as one reason for not removing the thickened membrane in these cases. In regard to this argument, however, experiments now being carried on by Dr. Knowlton in Dr. Mosher's laboratory at the Harvard Medical School have already shown that the mucous membrane, even with its cilia, regenerates in the dog after complete removal of the antral lining. The end-results of these experiments should go a long way toward settling the argument on the question of removal of antral lining.

Dreyfus [65] reported a case of unilateral Argyll Robertson pupil due to a tumor of the antrum.

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59. Miller, J. W.: Ann. Otol. Rhin. & Laryng. **36**:483, 1927.

60. Merkel, C. C.: Laryngoscope **37**:212, 1927.

61. Hollender, A. R., and Cottle, M. H.: Illinois M. J. **52**:106, 1927.

62. Hasty, F. E.: Paranasal Sinus Infection and Swimming, J. A. M. A. **89**: 507 (Aug. 13) 1927.

63. Harris, R., and Simpson, W. L.: Laryngoscope **37**:269, 1927.

64. Harkness, G. F.: Ann. Otol. Rhin. & Laryng. **36**:89, 1927.

65. Dreyfus, P. A.: Rev. d'oto-neuro-ocul. **5**:200, 1927.

Atkinsson [66] stated that there are many cases of headache of nasal origin of the chronic recurrent type without obvious signs of nasal disease.

OCULAR COMPLICATIONS

Crane [67] thoroughly reviewed the literature on the relationship of the sinuses to optic neuritis and reported twenty-four cases of his own. He urges that operation should not be delayed when no other cause can be found for the eye condition.

Oliver and Crowe [68] reported three cases of retrobulbar neuritis that apparently developed as a result of infection in the accessory sinuses, but they emphasize the fact that the patients should all be put through a thorough study to rule out distant foci of infection, such as the tonsils, the teeth and the genito-urinary tract.

White,[69] in reporting the data derived from his last sixty cases of disturbances of the optic nerve, urged conservatism in dealing with these cases. He also emphasized the importance of not overlooking distant foci of infection, and he states that it has been necessary to open the posterior sinuses in only a few cases.

Saeger [70] published a review of the embryologic development of the nasal sinuses, including several plates from Onodi's atlas on the nasal sinuses in children. He stated that in adults, inflammations of the nasal sinuses is certainly one of the most common causes of orbital inflammations, and he also believes that the same holds true in children in spite of the fact that many ophthalmologists believe otherwise. The author collected from the literature and described sixty-seven cases of orbital complications following disease of the nasal sinus in children. To the sixty-seven he adds one proved case of his own, that of a boy, aged 3, who had whooping cough. There was an increasing swelling of the left eye showing a high grade of inflammatory exophthalmos forward and outward. The eyelids were swollen, reddish and edematous, and there was a marked limitation of motion. The left fundus showed dilatation of the veins, but was otherwise normal. An operation revealed pus beneath the orbital periosteum in the region of the middle and posterior ethmoid cells with a sequestrum of the os planum. The culture from this pus was pure pneumococci. He reports a second case in a girl, aged 19 weeks; in this case also pus was obtained under the periosteum at the floor of the orbit. According to Saeger, some authors felt that there was a predisposing factor for orbital complications in children, but in the Freiburg eye clinic the feeling is that an essential

66. Atkinson, E. M.: Brit. M. J. **2**:264, 1927.

67. Crane, C. G.: Ann. Otol. Rhin. & Laryng. **36**:201, 1927.

68. Oliver, K. S., and Crowe, S. J.: Retrobulbar Neuritis and Infection of Accessory Nasal Sinuses, Arch. Otolaryng. **6**:503 (Dec.) 1927.

69. White, L.: Laryngoscope **37**:327 (May) 1927.

70. Saeger, F.: Klin. Monatsbl. f. Augenh. **78**:650 (May) 1927.

predisposition for rhinologic orbital inflammations does not exist in children.

Wilde [71] reported a case of keratitis profunda in which all treatment was resisted until a double radical operation was performed on the antrum. The operation was performed in spite of the fact that neither antrum was badly diseased. In summarizing, the author states that the clinically demonstrable evidence of a pathologic condition of the sinus extensive enough to produce an aggravated keratitis profunda may be surprisingly meager. In this particular case the mucous membrane of both antrums was polypoid, and one of them contained some mucopus.

Studies of the visual fields in cases of optic neuritis associated with sinus disease have been made and reported by Griscom and Monroe,[72] and by Brown.[73] Brown [74] emphasized the necessity of the test for color acuity in examination, as the threshold of color acuity becomes lowered before that for visual acuity. He stated that surgical intervention is indicated before the condition of perineuritis shown by lowered color acuity goes on to axial neuritis, which often causes permanent blindness.

Orbital abscesses secondary to involvement of the ethmoids and frontal sinuses are reported by Got and Callen,[75] Norris,[76] Missorici [77] and Jones.[78]

INTRACRANIAL COMPLICATIONS

Portmann and Moreau [79] discussed the occurrence of abscesses of the frontal lobe following frontal sinusitis. They stated that these cases are most common between puberty and the age of 30, decreasing after that until they are almost unknown after the age of 55. Approximately two males are affected to every female. As etiologic factors they stress trauma to an infected sinus and also incomplete operations on the frontal sinus, which leave behind infected pockets. Other authors reporting cases of abscesses of the frontal lobe complicating the frontal sinus are Imperatori,[80] Brown,[81] Middleton [82] and Badeaux.[83]

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71. Wilde, A. G.: Am. J. Ophth. **9**:892 (Dec.) 1926.
72. Griscom, J. M., and Monroe, M. M.: Arch. Ophth. **56**:244, 1927.
73. Brown, M. E.: Radiology **9**:418, 1927.
74. Brown, M. E.: New Orleans M. & S. J. **80**:364, 1927.
75. Got and Callen: Rev. de laryngol. **48**:456, 1927.
76. Norris, F. H. B.: J. Laryng. & Otol. **42**:459, 1927.
77. Missorici, A. Piazza: Riv. oto-neuro-oftal. **4**:424, 1927.
78. Jones, A. C.: Eye, Ear, Nose & Throat Month. **5**:263, 1926-1927.
79. Portmann, G., and Moreau, N.: Bull. et mém. Soc. de méd. et chir. de Bordeaux, Paris & Bordeaux, 1927, p. 365.
80. Imperatori, C. J.: M. J. & Rec. **126**:401, 1927.
81. Brown, J. M.: Ann. Otol. Rhin. & Laryng. **36**:710, 1927.
82. Middleton, W. S.: Wisconsin M. J. **26**:556, 1927.
83. Badeaux, G.: Union méd. du Canada **56**:579, 1927.

A complete report of a case of purulent leptomeningitis following removal of a polyp and an intranasal operation on the ethmoid cells was written by Turner and Reynolds.[84] Complete observations made at autopsy are reported, and the pathway of infection was traced along the sheath of the filaments of the olfactory nerve.

Vlasto [85] also reported a case of meningitis of sinus origin.

Nelson [86] suggested a surgical approach suitable for drainage of the meninges when the meningitis is of nasal origin. He reviewed the anatomy of the sinuses and the base of the skull, and stated that anterior subarachnoid drainage should be possible in meningitis originating in the paranasal cells bordering the cranial cavity.

Cassidy [87] cited a case of toxic vertigo due to paranasal infection. The eighth nerve was affected, and the patient had nystagmus. The condition promptly cleared up when the sinuses were operated on.

Two cases of insanity in which the patients were cured by an operation on infected sinuses are reported by French.[88] The author also reviews the literature and cites nineteen cases, eleven of which occurred in males and eighteen in females.

PARANASAL SINUSES IN CHILDREN

Dean [89] urges cooperation between the laryngologist and the pediatrician in cases of infection of the sinuses in children. He stated that each case must be studied by the two together, and that the "clinical sense" of the two will decide what the treatment ought to be.

Lupton [90] reported three cases of frontal sinusitis in young children. All three had orbital involvement.

Cone [91] made a study of seventy-one children entering the Iowa State Hospital for one year from March 1, 1925, who suffered from all forms of systemic lesions, including arthritis, eczema, asthma, chorea, bronchitis, bronchiectasis, malnutrition, anhydremia, nephritis, nephrosis, pyelitis, chronic ulcerative colitis, purpura, diabetes and other conditions. All these patients were under 11 years of age. Many of them were found to have infections of the upper respiratory tract, and in a large number, the systemic conditions were alleviated by removal or treatment of the foci (tonsils, adenoid or disease of the paranasal sinus) of the upper respiratory tract alone. Other patients required com-

84. Turner, A. L., and Reynolds, F. E.: J. Laryng. & Otol. **42**:515, 1927.
85. Vlasto, M.: Proc. Roy. Soc. Med. **20**:99, 1927.
86. Nelson, R. F.: Ann. Otol. Rhin. & Laryng. **36**:701, 1927.
87. Cassidy, W. A.: Nebraska M. J. **12**:417, 1927.
88. French, J. G.: Lancet **2**:13, 1927.
89. Dean, L. W.: Ann. Otol. Rhin. & Laryng. **36**:933, 1927.
90. Lupton, I. M.: Ann. Otol. Rhin. & Laryng. **36**:693, 1927.
91. Cone, A. J.: Laryngoscope **37**:19, 1927.

bined medical and surgical treatment, neither being sufficient in itself. The author stated that while it cannot be proved that disease of the paranasal sinus is the direct cause of these systemic conditions, it must be considered carefully as an etiologic factor.

Other articles on this subject have been published by Aland,[92] McWilliams,[93] Montgomery [94] and Shook.[95]

ROENTGENOLOGY

Proetz [96] has continued his studies of the physics and drainage of the sinus with the use of iodized oil, and several articles on the subject have been published by him during the past year. Among others to recommend the use of iodized oil in the study of the sinuses from an x-ray standpoint are Lobell [97] and Goodyear.[98]

From a developmental study of the nasal accessory sinuses Wasson [99] concluded and urged that more roentgenograms of the sinuses of infants should be taken. He stated that infection of the sinuses in children is common, and that the treatment in chronic disease of the paranasal sinus in adults is the treatment of an end-result of a previous sinus condition in childhood.

Culbert and Lay [100] cited an interesting case of identification of a body by means of roentgenograms of the accessory sinus and mastoid. A man died in India, and his body was so mutilated that identification was impossible except by x-ray pictures, which were compared with those taken some years before. Articles on technic have been written by Cross,[101] Claus,[102] and Samuel and Bowie.[103]

I have already referred to the difference of opinion that seems to exist among rhinologists concerning the value of the x-ray in the diagnosis of sinusitis. This difference of opinion is difficult to understand and must be based entirely on faulty technic plus poor interpretation of the x-ray plates. It is true that the x-ray reports on sinuses from many first-class roentgenologists are useless in helping the rhinologist; for example, it is of no help to him to get a report

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92. Aland, A. H.: California & West. Med. **27**:74, 1927.
93. McWilliams, C. A.: South. M. J. **20**:616, 1927.
94. Montgomery, D. C.: New Orleans M. & S. J. **79**:195, 1926-1927.
95. Shook, F. M.: Eye, Ear, Nose & Throat Month. **5**:255, 1926-1927.
96. Proetz, A. W., and Ernst, E. C.: Radiology **8**:502, 1927; Ann. Otol. Rhin. & Laryng. **36**:23, 297, 701 and 978, 1927.
97. Lobell, A.: Laryngoscope **37**:473, 1927.
98. Goodyear, H. M.: Ohio M. J. **23**:143, 1927.
99. Wasson, W. W.: Radiology **8**:398, 1927.
100. Culbert, W. L., and Law, F. M.: Identification by Comparison of Roentgenograms of Nasal Accessory Sinuses and Mastoid Processes, J. A. M. A. **88**:1634 (May 21) 1927.
101. Cross, K. S.: M. J. Australia **2**:569, 1927.
102. Claus, G.: Fortschr. a. d. Geb. d. Röntgenstrahlen **36**:677, 1927.
103. Samuel, E. C., and Bowie, E. R.: Texas State J. Med. **22**:452, 1926-1927.

which states that a sinus is "hazy" or "cloudy" or which contains other similar terms of description. The roentgenologist who is daily interpreting roentgenograms of the sinus should be, and is, able to differentiate much more. He states what the opacity is due to, whether it is thickened lining, pus, polypi, cysts or something else. He also is able to say whether or not activity is going on in the sinus, and in ninety-nine of one hundred cases he is right.

OSTEOMYELITIS

Hastings [104] reported a case of acute fulminating osteomyelitis of the frontal sinus. The patient recovered under conservative surgical measures; the first operation consisted of incision and drainage, and in the second one, six weeks later, several sequestrums were removed, and the dura was found exposed and much thickened. A culture taken at the time of the first operation showed a pure staphylococcus growth.

Bass [105] also reported a case of osteomyelitis of the frontal sinus evidently of a self-limiting, walled-off type. The patient recovered with a minimum amount of surgical intervention.

Merelli [106] cited a case of an infant 3½ months of age who showed much edema of the right lower eyelid, rapid in onset. Results of examination of the nose were negative, but a marked painful swelling was found in the mouth in the region corresponding to the hard palate. On the right side was a fistula from which pus exuded and into which a probe passed for several centimeters encountered necrotic bone tissue on the right alveolar margin. A conservative operation was performed, an incision being made into the gingivobuccal fold. The symptoms rapidly subsided, and the fistula closed. In discussing the case, the author stated that acute osteomyelitis of the superior maxilla in nursing infants is rare, that the diagnosis is difficult, and that the condition gives a characteristic triad: (1) swelling of the cheek at the alveolar margin and also that side of the palate, (2) the presence of superficial abscesses and fistulas in characteristic points and (3) expulsion of tooth buds and bony sequestrums. The conditions must be differentiated from phlegmon of the orbit, dacryocystitis and purulent ophthalmia. The prognosis is usually grave, the mortality being about from 30 to 50 per cent.

As regards operative intervention, Broca gives a distinction in the cases in which fistulas occur and those in which they do not. In the former, he advises cleaning up the abscess and removing the sequestrums and granulations to give adequate drainage. In the latter, he advises operating at the point of election which is the gingivobuccal sulcus.

104. Hastings, H.: Tr. Am. Laryngol. Soc., 1927, p. 46.
105. Bass, A. L.: Kentucky M. J. **25**:449, 1927.
106. Merelli, Gino: Riv. oto-neuro-oftal. **4**:431 (July-Aug.) 1927.

SINUSITIS AND SUPPURATION OF THE LUNG

Clerf [107] advocates thorough examination of the sinuses in all patients complaining of chronic cough. He stated that the unfavorable effect of chronic sinusitis on the bronchial infection in cases of chronic bronchitis suggests a similar influence in cases of chronic bronchiectasis. Irrespective of their etiologic relationship, treatment in cases of a co-existing suppurative sinusitis and bronchiectasis is not complete until the sinusitis is attended to as well as the bronchial condition. He is convinced that there is abundant proof that chronic disease of the sinuses is a factor in the condition of bronchiectasis, especially of the bilateral type.

Drea [108] stated that maxillary sinusitis is frequently associated with recurrent infections of the upper respiratory tract such as chronic bronchitis, bronchiectasis and certain forms of asthma.

Kistner [109] made a study of 196 cases of nontuberculous bronchitis, in all but six of which he was able to demonstrate a definite chronic infection of the sinuses. The ages ranged from 4 to 71 years. Of the 190 cases, 164 patients had their sinuses operated on. The results in this group were uniformly good, and in many cases brilliant. The extent of improvement seemed to depend on the degree of the pathologic change in the bony tissues and also on the ability to cure or control the disease. A number of patients were cured by simple lavage and conservative treatment, this being especially true in children. The best results, however, followed radical operations.

Preston [110] advocates early diagnosis by means of the x-ray and thorough operation on the sinuses to relieve the condition in the chest in these cases. He stated that in cases presenting a history of recurring pneumonia, infection of the sinuses should be suspected as an etiologic factor.

Schwartz and Weiner,[111] from the study of their series of cases, believe that a definite percentage of cases of chronic bronchitis and bronchiectasis is due to disease of the paranasal sinuses and that the condition may be relieved or prevented by proper treatment of the sinuses.

An increasing amount of literature is being published on this subject, and it all seems to bear out the observations of Mullin,[112] who reported the results of his work in 1926.

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107. Clerf, L. H.: Bronchiectasis Associated with Disease of Nasal Accessory Sinus, Arch. Otolaryng. **6**:28 (July) 1927.

108. Drea, W. F.: Ann. Otol. Rhin. & Laryng. **36**:341, 1927.

109. Kistner, F. B.: Northwest Med. **26**:203, 1927.

110. Preston, G.: Virginia M. Month. **54**:358, 1927.

111. Schwartz, M., and Weiner, H. L.: Am. Med. **22**:623, 1927.

112. Mullin, W. V.: The Relation of Paranasal Sinus Infection to Disease of the Lower Respiratory Tract, J. A. M. A. **87**:739 (Sept. 4) 1926.

News and Comment

THE AMERICAN BOARD OF OTOLARYNGOLOGY

An examination was held in Minneapolis, Monday, June 11, 1928. Forty-nine applicants were examined, forty-six of whom were granted certificates.

The Board will hold another examination in New York, Friday, Oct. 12, 1928, and one in St. Louis, Monday Oct. 15, 1928.

The Secretary, Dr. W. P. Wherry, Medical Arts Bldg., Omaha, Neb., will be glad to hear from those who desire to take one of the examinations mentioned.

Correspondence

TREATMENT OF VINCENT'S ANGINA

To the Editor:—I notice that in his paper, "A New Treatment for Vincent's Angina" (ARCH. OTOLARYNG. **7**:166 [Feb.] 1928) Dr. R. G. Reeves claims that acriviolet is a specific in the treatment of this disease.

The title would lead the members of the medical profession to believe that Dr. Reeves is the first to use acriviolet in the treatment of Vincent's angina. May I correct this impression by calling attention to the paper that I wrote in May, 1924, and read before the meeting of the American Laryngological, Rhinological and Otological Society at St. Louis, and published in the *Laryngoscope* in August, 1924? Under the title Vincent's angina, it will be seen that I called the attention of the medical profession to the value of acriviolet in the treatment of this disease. This was followed by another paper, published by Dr. A. J. Herzig in the *Laryngoscope,* June, 1926, which also calls attention to the treatment of Vincent's angina with acriviolet.

JOSEPH H. ABRAHAM, M.D., New York.

Abstracts from Current Literature

Ear

METHENAMINE PROPHYLAXIS IN OTOLARYNGOLOGY. LAVAL, Ztschr. f. Hals-, Nasen- u. Ohrenh. **18**:280, 1927. (From the Transactions of the German Otolaryngological Congress.)

Methenamine therapy for meningitis has been known for more than ten years. Laval had given it up as a remedy in persons with well established meningitis, but in the last three and one-half years he has used it with success as a prophylactic in patients with beginning meningitis. He uses 8 tablets a day by mouth. As the disease diminishes he reduces the dose to 6 or 4 a day. The diagnosis was made on the neurologic symptoms, as he is opposed to spinal puncture, believing that it spreads the infection which may still be localized. If the symptoms of meningitis are stormy, he uses the drug intravenously. The symptoms of disturbance of the bladder recede promptly when the medicine is stopped. Laval now treats persons with chronic suppuration with meningeal symptoms and those with circumscribed labyrinthitis with meningeal symptoms conservatively with methenamine for two weeks and then operates. There is usually a mild recrudescence of the meningitis for a few days. He also operated on three patients with chronic suppurative labyrinthitis and two patients with meningitis of mastoid and sphenoid empyema who were given methenamine intravenously; the operations were successful. Of acute forms, there were two severe and two light cases of meningitis; of the radical forms, there were six severe and ten mild cases of meningitis; there were twenty-one cases of partial and two of total destruction of the labyrinth. Of all these, one death occurred from a labyrinthogenous meningitis.

NEW METHODS FOR THE EARLY AND DIFFERENTIAL DIAGNOSIS OF INTRACRANIAL COMPLICATIONS. BRUENINGS, Ztschr. f. Hals-, Nasen- u. Ohrenh **18**:284, 1927. (From the Transactions of the German Otolaryngological Congress.)

Bruenings' theory of intracranial pressure is that the volume of the brain and spinal marrow is less than the bony cavities containing them and that this space is filled by the cerebrospinal fluid. The brain, the spinal marrow and the cerebrospinal fluid are incompressible. The only compressible contents are the venous plexuses. The elasticity of these keeps the intracranial pressure at an average of about 20 cm. water column. If puncture is performed, the liquor flows out but ceases at the moment the pressure reaches 0. Up to this point, Bruenings calls it the spontaneous flow. If venous pressure is raised by compression of the jugular veins, causing increased pressure in the venous plexuses, more fluid is forced out until the balance of pressure is again reached. This Bruenings calls pressure flow quantity (stauungs ausflus menge). That which remains behind is the residual liquor.

There are three types of increased pressure:

1. That due to an increased quantity of liquor. In terms of the water manometer, the highest recorded pressurers are: 80 cm. from a pathologic condition and 200 cm. under experimental conditions.

2. Pathologic and experimental pressure. The highest record by jugular and possibly abdominal pressure also is 75 cm.

3. Permanent pressure, which is due to increased volume of the brain or narrowing of the cranial shell. So far his highest record is 85 cm. (tumor of the brain).

In the absence of pathologic changes, a pressure increase of 75 or 80 cm. by venous pressure does not cause headache or vomiting. If the pressure is increased to 130 or 200 an increased blood pressure suddenly appears to prevent anemia

of the brain. These patients also show progressive paresthesia and later clonic convulsions, which may last some time after the pressure is released. Bruenings has never seen continued headache. The well known headache accompanying intracranial pressure must be due to causes other than the pressure.

The author states that it should be possible by jugular compression to distinguish between intracranial and extracranial causes of headache. In intracranial headache this method should distinguish between organic and functional causes. It is possible that the test will cause headache in intracranial lesions when spontaneous headache does not yet exist.

The author has experimented with headaches caused by diseases of the ear and those caused by diseases of the sinus and so far they were not increased by this pressure in any case. On the contrary, the venous hyperemia benefited some of the patients. The pain in glaucoma was increased, which is explained by the hydrodynamic connection of the eye and the brain. Positive reactions were obtained in all patients with leptomeningitis and painful tumors of the brain. (Bruenings has not had an opportunity to test abscess of the brain.) Positive reactions were also obtained in persons with toxic neuritides, i. e., postnarcosis headache, alcoholic headache and the prodromal headache of general infections. On the other hand, negative reactions were obtained in persons with extradural abscess, sinus thrombosis, migraine and traumatic-neurotic and neurotic headaches.

The author has devised an instrument for measuring the pressure during lumbar puncture, which is calibrated for convenient calculation according to his formula, but he warns against making the test by suboccipital puncture as dangerous. Tests are best made while the patient is lying down, and pressure should not be sufficient to stenose the arteries.

LEWY, Chicago.

DISTURBANCES OF SPEECH IN PATIENTS WITH OTOGENOUS ABSCESSES OF THE TEMPORAL LOBE. RUDOLF SONNTAG, Ztschr. f. Hals-, Nasen- u. Ohrenh. **19**:435 (Feb. 28) 1928.

1. In otogenous abscesses of the temporal lobe on the left side of right-handed persons, the diagnostically extremely important disturbances of speech occur much more frequently than Schmiegelow has thought. The author found them 155 times in 177 patients (87.5 per cent), whereas Schmiegelow found them only in 42 per cent (in twenty-three of fifty-four patients). The author does not doubt that the percentage will be still higher if more thorough examinations are made in every patient in whom the condition is suspected, whose mind is still clear, and especially if an examination is made daily.

2. Sensory disturbances of speech in persons with otogenous abscesses of the temporal lobe can be demonstrated as early as at the age of 3 years. In the majority of positive cases reported by the author, word amnesia, with or without paraphasia, was established without determining the presence of other kinds of sensory aphasia. This suffices for the diagnosis. If this is established, further time should not be lost. Immediate operation is indicated. After the abscess has been evacuated, the various aspects of aphasia should be carefully investigated and followed up. The neurologist should cooperate whenever possible. Further facts may be found by thorough study.

TURNING NYSTAGMUS INFLUENCED BY DIFFERENT EXPERIMENTS, AND THE IMPORTANCE OF CONTRALATERAL CONNECTIVE FIBERS OF THE VESTIBULAR NERVE. W. UNDRITZ, Ztschr. f. Hals-, Nasen- u. Ohrenh. **19**:444 (Feb. 28) 1928.

In physiologic studies of the vestibular apparatus in the animal, the method of Bartels-Topolansky is preferable, because curves of the single eye muscles can be obtained. This method is used in the pharmacologic institute of Magnus in Utrecht. Lorento de Nò in Bárány's clinic developed it further. Undritz made 500 curves of tests made on eighteen rabbits. The movements of the eye

muscles were recorded by levers made of aluminum. The kymograph was mounted on a rotating disk. The fixated rabbit with the lever could be turned with the kymograph.

1. The perceptible minimum for the vestibular apparatus of the rabbit is found at an angle velocity of 3 degrees per second.

2. During fast turning, the tonic contraction of the eye muscles becomes larger; the excursions of the nystagmus becomes mostly smaller and more frequent.

3. The muscle tonus which remains during rotation and after the fading away of the nystagmus is explained by the effect of the centrifugal force and is referred to the otolith apparatus.

4. Irregular rotation influences the after-nystagmus little if the number of rotations and the general duration remain unchanged, i. e., if the average velocity of rotation remains the same.

5. Optic influences on the vestibular nystagmus of the rabbit are of little importance.

6. Even in total darkness, a typical nystagmus and after-nystagmus occurs with only a little turning.

7. On turning in the frontal plane, the musculus superior and the musculus inferior in particular contracted and relaxed, but the oblique muscles showed these phenomena on turning in the sagittal plane.

8. The nystagmus and after-nystagmus is of shorter duration in these planes than it is on turning in the horizontal plane.

9. After a sagittal cut of the fourth ventricle, a typical nystagmus cannot be elicited either by calorization or by turning.

10. A paramedial cut of the fourth ventricle produces a spontaneous nystagmus which can be influenced experimentally. In these instances, the slow component could be observed frequently after irritation.

11. The latter experiments point to the functional importance of the contralateral vestibular fibers. They are a necessary factor for the production of the typical nystagmus in peripheral vestibular irritation. (Lorente de Nò succeeded in producing the slow component of the nystagmus. After complete splitting of the medulla, the turning reaction extended to the eyes and the head. Typical nystagmus was absent also in his experiments.)

AMBERG, Detroit.

BETTER CURVES OF VESTIBULARY TURNING NYSTAGMUS. I. OHM, Ztschr. f. Hals-, Nasen- u. Ohrenh. **19**:467 (Feb. 28) 1928.

The author has published three essays concerning the influence of vision on vestibulary turning nystagmus and after-nystagmus (*Ztschr. f. Hals-, Nasen- u. Ohrenh.* **16**:521; **17**:259; and **19**:87, 1927). He presented tracings which showed that the after-nystagmus is almost absent in the light, whereas it is markedly present and is of long duration in total darkness. Only in total darkness can vestibulary irritation be shown by the aid of nystagmus. A defect on registration of the movements of the eye was caused by a flinging motion of the lever when a certain velocity was reached. This defect was obviated almost entirely by connecting a watchspring with the lever, which created a certain resistance. Turning in total darkness showed, as before, a jerking turning nystagmus of a smaller amplitude and frequency and a marked after-nystagmus of long duration. The author examined six miners with nystagmus. During turning, with the eye looking forward, the miners' nystagmus was absent. Two whole turns were used, first to the left, then to the right, in the light and in the dark. The nystagmus during turning, in the light and with open eyes, is an opticovestibulary mixed nystagmus. Even if the occupational nystagmus is influenced by the horizontal semicircular canals, as the author will prove later by tracings, he is inclined to assume that the nerve endings in the vestibulum are of greater importance for the mechanism of miners' nystagmus than the ampullae. The experiments are described in detail.

THE DEVELOPMENT OF COMPLICATIONS IN DIFFERENT FORMS OF ACUTE INFLAMMATION OF THE MIDDLE EAR. BROCK, Ztschr. f. Hals-, Nasen- u. Ohrenh. **19**:476 (Feb. 28) 1928.

The results of the investigations of Krainz, which seemed to contradict the observations made by Scheibe in 1904, caused the author to undertake a similar study. The author did not confine himself to cases of genuine otitis as Krainz did, apparently, but he examined the cases as they occurred. In the thirty-two cases of acute otitis media which the author examined, thirty-nine complications were found, namely, twenty-six complications among twenty-three genuine cases and thirteen complications among eight cases of otitis after grip. Of the twenty-six complications in genuine cases, twenty-two (84.6 per cent) had developed through fistular perforation of an empyema and four (15.4 per cent) along dilated marrow spaces that were infiltrated by inflammation. Empyema was not always present. Of the thirteen complications in cases of grip, eleven (84.6 per cent) were caused by fistular perforation of an empyema and two (15.4 per cent) through propagation along dilated marrow and vessel spaces without empyema.

Taking in consideration also the results of Otto Mayer in his cases of otitis media acutissima, the author states that the infection extends beyond the spaces of the middle ear in the following ways: 1. Pus wanders into the adjacent tissue through fistular perforation of an empyema, namely, of pus under pressure. This modus operandi is by far the most common; 84.6 per cent of all complications in genuine cases and the same percentage in cases of grip developed in this manner. 2. Infection occurs by propagation through marrow or vessel connections, namely, (*a*) along normal vessels and marrow spaces (cases of otitis media acutissima. These cases were rare and had not been observed by the author); (*b*) along marrow and vessel connections which have existed previously or which have been created through the inflammatory process, but which have been enlarged by action of the osteoclasts. This can occur with or without empyema. This mode of complication could be established in 15.4 per cent of the genuine cases and in the cases of grip. In the same manner, the complications occurred in a case of diabetes.

The author speaks of four cases of Otto Mayer in which the patient came to operation on the third and fourth day after the start of the infection of the ear on account of the grave general symptoms, stupor and violent pain. A severe purulent and hemorrhagic purulent inflammation was found. In some, a small perisinous abscess was present. Histologic examination in these four cases showed: (1) purulent hemorrhagic exudation into the mucous membrane, into the pneumatic cells and vessel channels and into the marrow spaces; (2) enormous dilatation of the blood vessels in the mucous membrane of the cells and of the bone, partly with thrombosis of the vessels and perivascular infiltration; (3) slight osteoclasis in the vessel channels, and (4) formation of osteoid borders in the walls of the pneumatic cells.

AMBERG, Detroit.

Pharynx

INFANTILE NASOPHARYNX AND ITS CONSTITUTIONAL INFERIORITY. KARL BERNFELD, Ztschr. f. Hals-, Nasen- u. Ohrenh. **19**:516 (Feb. 28) 1928.

Testut-Jacob described three types of infantile nasopharynx: the pointed arch, the rounded arch and the low arch. Bernfeld comes to the following conclusions:

1. The normal spacious epipharynx develops from the low infantile type.

2. If the growth of the epipharynx is retarded, an infantile type persists. This constitutes a constitutional inferiority.

3. The infantilism of the epipharynx manifests itself by the frequency of oto-nasopharyngeal inflammations, and by faulty ventilation of the upper respiratory tract. The proximity of the pathologically changed mucous membrane is of importance in regard to the duration and extent of diseases.

4. The constitutional inferiority of the persisting infantile nasopharynx is connected with other constitutionally inferior organs, for instance, with an infantile tube and a shallow tympanic cavity. Hereby the pneumatization of the temporal bone is influenced. Explanation of the frequency of this occurrence requires further anatomic investigations.

5. Digital exploration of the epipharynx reveals conditions in the three dimensions, namely, in the palatosphenoidal, the pharyngonasal and the tubotubal diameters. The palatosphenoidal diameter is shortened most frequently. Investigations at necropsies are desired to further the study of these observations.

Occurrence of Diseases in Persons with Normal Spacious or Infantile Epipharynges

Diseases	Normal Spacious Epipharynx, 60 Treated Patients	Infantile Epipharynx, 60 Treated Patients
Nasopharyngitis	22	40
Hypertrophied tonsils	12	11
Adenoids	18	32
Recurrence of adenoids	3	8
Catarrhal otitis without adenoids	4	19
Catarrhal otitis with adenoids	12	28
Otitis suppurativa chronica mesotympanica nonspecifica	8	13

AMBERG, Detroit.

Larynx

HYPERKERATOTIC AND PRECANCEROUS FORMATIONS IN THE LARYNX. KLESTADT, Ztschr. f. Hals-, Nasen- u. Ohrenh. **19**:500 (Feb. 28) 1928.

A woman, aged 68, suffered from hoarseness, which had been developing for several weeks. The posterior half of the right vocal cord was covered with warts resembling fungi. On the left vocal cord was a white patch within a field resembling a wafer formation, behind which small, sharp elevations were seen. The specimen from the right vocal cord showed the picture of pachydermic and mostly hyperkeratotic processes (pachydermic spot, nucleated cornifying layers, cornified layers, spot of atypical proliferation of epithelium with anaplasia, atypical mitoses, direct division, coagulated nucleus, subepithelial infiltration).

A detailed histologic picture is presented. During the weeks following examination, the vocal cords were covered by smooth thin epithelium. Within seven weeks, the pathologic picture was replaced by a normal appearance. Another patient, a man, aged 68, had suffered from extensive hyperkeratotic pachydermia which, with a large portion of the vocal cords had been removed by laryngofissure. Two years later, another hyperkeratotic mass was found on the anterior portion of the left vocal cord. Four years later, no trace of pachydermia could be seen.

The histologic appearance of the epithelium of the first patient corresponded with a condition which is designated as "precancerous." The author comes to the conclusion that hyperkeratosis in the larynx is only a term for various inflammatory hyperplastic and blastomatous processes, also for combinations of the same or forms of transition.

Precancerous formations also occur in the larynx. Such a condition was found in pachydermia, which is sometimes hyperkeratotic, and which is known as a precursor of cancer, but which is not a precancerous condition in itself.

SARCOMA OF THE LARYNX. M. SLOBODNIK, Ztschr. f. Hals-, Nasen- u. Ohrenh. **19**:505 (Feb. 28) 1928.

Of 9,554 carcinomas, 64 were of the larynx, and of 848 sarcomas, 1 was of the larynx (Gurlt's statistics). According to Hahn, Kraus and Schmidt, the incidence of sarcoma of the larynx is found to be one to from seventeen to twenty-

five carcinomas. The author reports a case in point. A man, aged 68, who had suffered from hoarseness for two years, consulted Dr. Albesheim in the beginning of 1926. The condition followed an attack of grip. For half a year, the patient suffered from a slight, unproductive cough. A tumor the size of a large walnut was found in the larynx, beginning 1 cm. from the right margin of the aryepiglottic ligament and extending to the inner side of the thyroid cartilage. It covered the right portion of the larynx and extended beyond the middle line to the left, leaving a narrow slit for respiration. The growth was of rather hard consistence and was bluish red. Examination of a small section revealed a rhabdomyosarcoma. On Sept. 23, 1926, at the Virchow Hospital, the larynx was removed under local anesthesia. The surrounding glands were not swollen. Two months later, the wound had completely healed. Half a year later, the patient was free from complaint. The histologic picture of the tumor corresponded to that of a polymorphonuclear sarcoma.

In sarcoma of the larynx, pain is rare. There is extremely little tendency to ulceration. Most frequently, spindle cell sarcomas are found, originating in the anterior half of the larynx. Fibro-angio-adenosarcomas, chondrosarcomas, fibromyosarcomas and lymphosarcomas are infrequent. Sometimes mixed tumors present themselves — for instance, there are spindle cells and round cells in the same tumor. Patients suffering from lymphosarcoma can live for a long time. Even after from seven to nineteen years, death occurs not in consequence of tumor cachexia, but in consequence of suffocation or exhaustion caused by respiratory difficulties or pneumonia. Occupational overexertion does not predispose one to sarcoma of the larynx. Men are more frequently affected than women (in a ratio of about 20:1). The points of differentiation from carcinoma are: the duration, the rare and late disintegration, the absence of swollen lymphatic glands, the absence or insignificance of inflammation and infiltration in the surrounding tissue and the presence of frequently detached, nutlike tumors of various sizes.

SOME RARE FORMS OF PATHOLOGIC CORNIFICATION IN THE UPPER RESPIRATORY TRACTS. A CASE OF DIFFUSE HYPERKERATOSIS OF THE LARYNX WITH FATAL OUTCOME. GEORG FINDER, Ztschr. f. Hals-, Nasen- u. Ohrenh. **19**:523 (Feb. 28) 1928.

Some pathologic cornifying processes in the upper respiratory and digestive tracts are comparatively frequent, for instance, Siebenmann's hyperkeratosis lacunaris of the tonsils, black hair tongue and leukoplakia. Less known are the hyperkeratotic processes of the mucous membrane which accompany, or are part of, dermatoses and are called "hyperkeratosis," or "keratosis." In 1912, O. Seifert observed a case and cited sixteen cases mentioned in the literature in which Darier's disease, "psorospermosis vegetans follicularis," showed a localization in the oropharynx, partly in the form of white nodules, surrounded by a hyperemic ring on the mucous membrane of the cheek and palate, the size of a pinhead, and partly in the form of hypertrophy and white colorization of the lingual papillae. Since then, cases have been reported in which the mucous membrane of the upper air and digestive passages had been affected. Among the patients was a child, aged 27 months. All others agree that the "corps ronds" which are always found in the skin in Darier's disease are never found in the mucous membrane. These "corps ronds" are changed epithelial cells which were erroneously taken for psorospermias by Darier.

In acanthosis nigricans, the papillary hypertrophy and pigmentation is more pronounced than hyperkeratosis. Porokeratosis is characterized by its common, but not exclusive, relation to sweat glands. In some cases, it was localized on the mucous membrane of the lip and cheek and on the tongue and palate. The author quotes a number of cases of similar conditions from the literature, which must be read in the original, and reports a case of hyperkeratosis. The patient, a woman, aged 45, had been hoarse for half a year, and was seen by Finder in November,

1924. Both vocal cords showed a chalklike covering, from which small pointed parts emanated. The white masses were rather hard to the touch. The lungs were normal, and the Wassermann reaction was negative. Treatment with pepsin and 10 per cent salicylic acid solution (Fein) was unsuccessful. The condition progressed from bad to worse. Tracheotomy and, later, laryngofissure were recommended, but refused by the patient, so that the author was obliged to confine his therapy to endolaryngeal excisions. The patient died in January, 1926, with the symptoms of dyspnea and exhaustion. Besides the vocal cords, the right false vocal cord and the anterior subglottic region were affected.

AMBERG, Detroit.

Nose

INFLUENCE OF THE X-RAY AND ACUTE INFLAMMATION AND SPECIAL REFERENCE TO MUCOUS MEMBRANES. MITTERMAIER, Ztschr. f. Hals-, Nasen- u. Ohrenh. **18**:260, 1927. (From the Transactions of the German Otolaryngological Congress.)

Although others have stated that it is impossible to influence inflammations in closed cavities lined by thin membrane, that is, the accessory sinuses, the author experimented on the hard palate of rabbits, making injections of diphtheria toxin and producing necrosis of the mucosa of the hard palate. He shows photomicrographs of the ulcerative process in control animals, and an absence of ulceration in those irradiated twenty-four hours after injection. In those irradiated three days after injection, there was a definite line of demarcation as compared with a spreading process in the controls. Mittermaier realizes the difference between an open sore subjected to the rubbing of the tongue and open drainage as compared with the nasal sinus. He also experimented with silver nitrate catgut buried in the tissues of guinea-pigs. Irradiation of these animals greatly reduced the reaction time and the time required for the restitution of integrity.

He is now conducting experiments to determine the influence on more superficial, so-called catarrhal inflammations, but he concludes that there is no doubt that inflammatory processes may be favorably influenced by irradiation.

His technic consisted of 1/10 Holzknecht epidermal dose of 150 kilovolts, 35 cm. focal distance and a filter of 3 mm. aluminum.

LEWY, Chicago.

PREVENTION OF RETROGRADE OTOGENOUS THROMBOSIS OF THE SIGMOID AND TRANSVERSE SINUSES. BIRKHOLZ, Ztschr. f. Hals-, Nasen- u. Ohrenh. **19**:463 (Feb. 28) 1928.

It is an acknowledged fact that in otogenous thrombophlebitis of the sigmoid and transverse sinuses the diseased portion of the sinus cannot be excluded from the circulation with certainty. The propagation of the infected thrombus toward the heart can be prevented. It is different with the distal end of the thrombus. Frequently a primary thrombus of the sinus or jugular bulb extends in a retrograde direction. The author experimented on the cadaver. The "German horizontal line" is divided in three parts. (The line connects the base of the ascending portion of the temporal line with the protuberantia occipitalis externa). The point of attack lies where the posterior and middle third meet, namely, about from 3 to 5 cm. from the protuberantia. A skin periosteal flap with its base downward is made. The vertical length is about 5 cm. The linea nuchalis superior passes about through the middle. It corresponds with the course of the sinus. The bone is rather thick. A rectangular groove (of 2 by 4 cm. in height) is created with Killian's groove chisel. At the upper border an opening the size of a bean is made. After careful displacement of the dura by leverage with the Bruening double elevator in the direction of the bone quadrangle, which must be resected plastically, the bone flap is cut out or broken off at the lower end. The sinus is found lying across the dura as a blue ribbon. In order to close the sinus three methods can be used: (1) A double ligature can be applied by circum-

stitching, and the sinus can be slit; (2) pressure can be exercised on the sinus in two places according to Whiting-Meier, and then it can be split; (3) it can be obliterated. The first method is used by surgeons who operate on the brain. The author attempted to use the method, at this spot, but found that the subdural space was opened, thus creating a way for infection. The Whiting-Meier method alone does not appear to the author to be sufficiently safe. Therefore, he combines it with the intravenous injection of corrosive sublimate as advised by Linser many years ago for varicose veins. It is not difficult to inject 1 cc. of a 1 per cent sterile solution of corrosive sublimate into the free sinus after pressure has been exercised on the peripheral portion. In the living, in the presence of sinus thrombosis, the sinus transversus should be exposed simultaneously with the removal of the focus; through pressure the blood column should be brought to stagnation between the sinus and the spot which should be obliterated, and artificial coagulation should be instituted. While the author did not have any opportunity to use this safe method, he advises its use in severe cases. The operative wound should be closed primarily by placing the osteoplastic flap in situ.

AMBERG, Detroit.

Miscellaneous

EFFECT OF ENDOCRINE GLAND EXTRACTS, ESPECIALLY THYMUS, ON ASTHMA, HAY-FEVER, ETC. SPIES, Ztschr. f. Hals-, Nasen- u. Ohrenh. **18**:250, 1927. (From the Transactions of the German Otolaryngological Congress.)

Encouraged by his results with insulin in dry throats in nondiabetic patients, Spies has experimented with thymus in persons with allergic diseases, i. e., those characterized by eosinophilia. He has also extended the use of insulin to persons with pachyderma and singers' nodes. He believes that the underlying cause of allergy is endocrine imbalance, which he reaches by the administration of thymus.

ROENTGENOTHERAPY FOR OTHEMATOMA AND INFLAMMATION OF THE UPPER AIR PASSAGES. ESCH, Ztschr. f. Hals-, Nasen- u. Ohrenh. **18**:255, 1927. (From the Transactions of the German Otolaryngological Congress.)

The author has used roentgenotherapy in persons with acute and chronic diseases of the nasal sinuses. Seven patients who entered the hospital for operation were cured by this treatment alone. The technic consisted of a 30 per cent Holzknecht epidermal dose, with 30 cm. focal distance, 180 kilovolts, 4 milliamperes, filter, 0.5 zinc plus 3 mm. of aluminum given at intervals of four weeks.

INFLUENCE OF NATURAL GLUCOSIDES ON THE EFFECT OF COCAINE. JUNG, Ztschr. f. Hals-, Nasen- u. Ohrenh. **18**:267, 1927. (From the Transactions of the German Otolaryngological Congress.)

A preparation was sought that would be less toxic than cocaine. It should be nonirritating and water-soluble. It must be possible to use it with epinephrine, and it must be able to penetrate the mucosa.

Various experiments were made on the corneas of rabbits and on preparations of nerve and muscle and the Turk experiment was also made (withdrawal of a frog leg from hydrochloric acid solution).

A number of glucosides were tried and finally adonidin was selected as fulfilling these tests. A 1 per cent solution of adonidin with a 2.5 per cent solution of cocaine was sufficient for most operative work on the nose. With a 10 per cent cocaine solution, it was sufficient for most laryngeal work.

The convulsive action of cocaine was counteracted by the adonidin, and the stimulation of the heart by the adonidin was counteracted by the cocaine. It also acts synergistically with procaine in nerve block.

LEWY, Chicago.

TRACHEOCELE: REPORT OF CASE. T. F. CHORUZENKO, Ztschr. f. Hals-, Nasen- u. Ohrenh. **19**:537 (Feb. 28) 1928.

The author could not find more than ten cases of tracheocele in the literature. He described the modus operandi of the development. The case in point was discovered in a cadaver of a woman, aged 36. The oval-shaped formation, the size of a pigeon's egg, was located in the region between the middle of the first and the middle of the second thoracic vertebrae. It was adjacent to the right lateral wall of the trachea and esophagus and was connected with the trachea by a pedicle resembling connective tissue. The lateral and anterior surfaces were covered by mediastinal cell tissue and touched the upper lobe of the right lung. The tracheocele was empty and contained cylinder epithelium. The pedicle which connected it with the trachea contained a channel that was passible by a probe of 1.5 cm. thickness. A decayed gland, the size of a pea, was found at a distance of 1 cm. over the protuberance. A perforation of the trachea was not found at this spot. Petit is of the opinion that a diverticular protuberance is caused by suppurating glands of the trachea and the mediastinum. This view seems to be confirmed by the observations in the case of the author.

AMBERG, Detroit.

Society Transactions

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY

Regular Meeting, Feb. 6, 1928

FRANK NOVAK, M.D., *Vice-President, Presiding*

ALTERATION IN THE ACTIVITY OF THE EIGHTH NERVE PRODUCED BY RAPID CHANGES IN THE BLOOD PRESSURE IN THE NORMAL HUMAN BEING. By DR. J. FRANK PEARCY and DR. DANIEL B. HAYDEN.

In clinical hypertension there is frequently a decrease in auditory acuity for the higher (but not the highest) tones. Such patients commonly complain of tinnitus aurium and vertigo. That these symptoms are caused by the high blood pressure per se is a gratuitous assumption. It is equally likely that the pathologic structural changes associated with the hypertension produce the symptoms. In some instances, hypotension has been associated with vertigo, tinnitus and a similar defect in hearing. These symptoms are found occasionally in severe cases of anemia.

One is tempted to speculate on a common cause for the symptoms in the three cases. Such a cause might be an insufficient supply of oxygen to the internal ear. There is a decreased supply of oxygen in severe cases of anemia. In marked hypotensions there is also a considerable decrease in the supply of oxygen. Hypertension is frequently associated with arteriosclerosis. Arteriosclerosis of the arteries leading to the internal ear could diminish the supply of blood and thus the supply of oxygen to the internal ear as it does to the legs in cases of intermittent claudication and to the heart in angina pectoris. But, presumably, a diminished supply of oxygen should affect the entire auditory scale and not the higher tones alone.

A large model Western Electric (I-A) Audiometer and the usual rotation methods were used. An increase in blood pressure was obtained at first by the use of ephedrine. It was not used after a few experiments because of the unpredictability of its effects. In some cases ¾ grains (0.048 Gm.) raised the pressure 40 mm. of mercury. In other cases 1½ grains (0.097 Gm.) raised it only 10 mm. of mercury. Epinephrine injected subcutaneously and massages as recommended by Luckhardt proved entirely satisfactory. The blood pressure could invariably be raised from 50 to 80 mm. of mercury in a short period. It remained at a constant high level long enough for satisfactory labyrinthine tests to be made.

The blood pressure was lowered by use of sodium nitrite in doses of from 3 to 5 grains (0.195 to 0.324 Gm.).

Results.—A decrease in blood pressure from a normal of 128 mm. to 100 mm. of mercury caused considerable impairment in hearing, whereas an increase from 128 mm. to 160 mm. of mercury caused considerable increase in auditory acuity. In the instances of both decreased and increased blood pressure, the auditory changes were detected only in the upper tone limits. Perception of the highest tones was modified only in a few cases in which the blood pressure was lowered.

Raising the blood pressure increased the vestibular responses, whereas lowering the blood pressure decreased the response. Typical responses were as follows: with normal blood pressure of 124 mm. of mercury there was no spontaneous nystagmus or past pointing. On rotation to the right ten times in twenty seconds, the after-nystagmus was of moderate amplitude, lasting twenty seconds; rotation to the left ten times in twenty seconds, the after-nystagmus was of moderate amplitude, lasting twenty-one seconds; on rotation to the right ten times in ten seconds, the past pointing with the right hand was 8 inches, without drifting; on rotation to the right ten times in ten seconds, past pointing with the left hand was 6 inches, without drifting; on rotation to the left ten times in ten seconds, past

pointing with the right hand was 8 inches, without drifting; on rotation to the left ten times in ten seconds, past pointing with the left hand was 6 inches, without drifting. Fifteen minutes after subcutaneous injection of ½ c.c. 1 : 1,000 epinephrine the blood pressure was 160 mm. of mercury. On rotation to the right ten times in twenty seconds, the after-nystagmus was violent, lasting twenty-eight seconds; on rotation to the left ten times in twenty seconds, the after-nystagmus was violent, lasting twenty-eight seconds; on rotation to the right ten times in ten seconds, past pointing with the right hand was 13 inches, with drifting to the right to a right angle and upward; on rotation to the right ten times in ten seconds, past pointing with the left hand was 12 inches, with drifting to the right to a right angle and upward; on rotation to the left ten times in ten seconds, past pointing with the right hand was 12 inches, with drifting to the left to a right angle and upward; on rotation to the left ten times in ten seconds, past pointing with the left hand was 13 inches, with drifting to the left to a right angle and upward. With normal blood pressure of 122 mm. of mercury there was no spontaneous nystagmus or past pointing. On rotation to the right ten times in twenty seconds, the after-nystagmus was moderate, lasting twenty-one seconds; on rotation to the left ten times in twenty seconds, the after-nystagmus was moderate, lasting twenty seconds; on rotation to the right ten times in ten seconds, the past pointing with the right hand was 8 inches, without drifting; on rotation to the right ten times in ten seconds, past pointing with the left hand was 6 inches, without drifting; on rotation to the left ten times in ten seconds, the past pointing with the right hand was 8 inches, without drifting; on rotation to the left ten times in ten seconds, past pointing with the left hand was 6 inches, without drifting. One and one-half hours after taking 3 grains (0.195 Gm.) sodium nitrite per os the blood pressure was 100 mm. of mercury. On rotation to the right ten times in twenty seconds, the after-nystagmus was small, lasting eight seconds; on rotation to the left ten times in twenty seconds, the after-nystagmus was small, lasting seven seconds; on rotation to the right ten times in ten seconds, past pointing with the right hand was 1 inch to the right; on rotation to the right ten times in ten seconds, past pointing with the left hand was 1 inch to the right; on rotation to the left ten times in ten seconds, past pointing with the right hand touched; on rotation to the left ten times in ten seconds, past pointing with the left hand touched.

Comment.—It is conclusively demonstrated that a lowered systolic blood pressure produces symptoms similar to those found in clinical hypotension but that a raised systolic blood pressure produces symptoms opposite to those observed in clinical hypertension. To explain these hypertensial labyrinthine symptoms, one must look to something other than the raised systolic pressure.

We can conceive of no way in which changes in the systolic blood pressure could cause this alteration of acuity of hearing except by an alteration in the vascular supply of that portion of the cochlea in which upper tones of the scale are heard.

By an analogy from a study of the effects of changes in the systolic blood pressure on the vessels of the optic fundus, one would expect that when vaso-constrictors are administered the arteries of the ear are constricted and when dilators are used dilatation of these arteries results. We cannot account for the alteration in vestibular activity produced by changes in the systolic blood pressure.

Conclusions.—1. A sudden lowering of a normal systolic blood pressure by from 20 to 30 mm. of mercury produces an auditory impairment of from 15 to 20 per cent. A sudden raising of normal systolic blood pressure by from 20 to 40 mm. of mercury produces an increased auditory acuity of from 10 to 15 per cent in the higher tone scale between 512 and 8,192 double vibrations, the lower and the higher tones being unaffected.

2. A similar lowering of the blood pressure decreases the duration of the after nystagmus from 60 to 70 per cent and the past pointing from 75 to 85 per cent. A similar raising of the blood pressure increases the duration of the nystagmus from 10 to 20 per cent and the past pointing from 30 to 50 per cent.

DISCUSSION

DR. AUSTIN A. HAYDEN: I consider this subject of great importance, and if the experiments did nothing else than point the way to the relief of seasickness, they would be well worth while. I was much surprised to find on my recent trip to Europe that the chief surgeon on the *S. S. Roosevelt,* had found hypodermic injections of sodium nitrite the most useful and effective drug he had used for this purpose. I am glad to learn that one patient suffering with tinnitus had been treated by Dr. Pearcy, and I should be interested to learn what results could be expected from the use of the drug in this disorder.

How long does the blood pressure remain elevated after the use of epinephrine and ephedrine?

In talking with the ship's surgeon, I was astonished to find that so small an amount of investigation has been carried on in regard to seasickness. A good field for research could be gained if the various steamship companies and the surgeons on ocean liners would be interested in the matter.

DR. ARTHUR M. CORWIN: I am much interested in the subject, and I think that the next step in the experiments should be to take a series of patients who become seasick and make a study of their blood pressure with a view of determining whether patients with high blood pressure are more likely to be seasick than those with normal pressure, thus deciding whether there is a relationship between blood pressure and seasickness.

DR. FRANK NOVAK: Was nitroglycerin used in the experiments?

DR. DANIEL B. HAYDEN: The effect of epinephrine lasted several hours. Clinically, the symptoms of hypertension and hypotension are exactly the same. When we started this work, we did not expect to find any variations in hearing by increasing or diminishing the blood pressure.

We did not use nitroglycerin, because our work was done on human beings. The maximum effect from the nitrite was obtained in about thirty minutes.

DR. HARRY L. POLLOCK: I have taken readings on the blood pressure in many cases following the use of 0.5 cc. of epinephrine, and the rise lasted only from three to five minutes. The pressure increased rapidly but fell just as quickly, and according to the physiologists, the same is true of epinephrine. I feel sure that no relation exists between blood pressure and seasickness.

DR. J. FRANK PEARCY: Dr. Luckhardt has found that by subcutaneous use of epinephrine the blood pressure could be kept elevated for many hours — until the following day, while if given intravenously, it caused a sudden rise and an equally sudden fall, as Dr. Pollock has stated.

THE RELATIONSHIP OF ORTHODONTIA TO OTOLARYNGOLOGY. By DR. BURNE O. SIPPY.

There are definite functions governing the normal development of the human denture. A perversion of such functions causes malformation of the face and jaw.

The mandible performs two important functions, namely, mastication and respiration. At birth all of the teeth, except the second and third permanent molars, have begun to develop. In the upper jaw they occupy almost all of the space to the floor of the nose and orbit with little indication of maxillary sinus. Each tooth germ is enclosed in a crypt, a wall of cribriform plate having spicules of cancellous bone. As the tooth develops, pressure is created, and the crypt wall is pushed backward through cancellous bone. The growth of the tongue and the organs of the mouth exert pressure from the lingual. The muscular forces from outside, namely, the muscles of mastication, deglutition, respiration and expression act as mechanical stimuli to produce a reaction of connective tissue cells, resulting in growth. Growth of the crown causes absorption of the roof of the crypt as the tooth moves occlusally, cutting through the overlying soft tissue. As the tooth moves occlusally, the bone grows with it, forming the alveolus. The thickness and the length and the width of the jaws increases as the teeth grow outward, and

forward and occlusally. The maintaining of the normal relation of the jaws to each other, and the development of the maxillary sinuses, the nasal passage and the septum depend on the balance of muscular force. A lack of these normal forces or a change in the direction of these forces will change entirely the development of the bones of the face and jaws and result in malocclusion. This condition may be complicated by a mutilation as in the involvement of congenitally absent teeth, extracted teeth, cleft palate and harelip, including the nose, fractures of the mandible or maxilla, postoperative conditions following the surgical removal of tumors, etc.

Orthodontia is that science which has for its object the correction of malocclusion. Occlusion, the basis of orthodontia, is the normal relation of the occlusal inclined planes of the teeth when the jaws are closed. Malocclusion is the perversion of the normal. The practice of orthodontia has to do with the correction of the malocclusion of the teeth and malformation of the related bones of the face and jaws. The term mesial means toward the median line; distal is the opposite term and might imply to you, posterior.

The first permanent molar is considered the key to occlusion. It performs many important functions in the development of the denture, the more important of which are, that it determines the length of the bite of the adult denture; it governs the position of teeth mesial and distal to it; it is the most constant of the teeth in taking its normal position and it is the most constant in its time of eruption and, therefore, has been termed the six year molar. For the reasons mentioned and others, it is the basis of the classification of malocclusion.

According to Angle, all malocclusion is divided into three groups: Class 1, malocclusion is characterized by normal mesiodistal relation of the jaws as indicated by that normal mesiodistal position of the first permanent molar. Both jaws are equally underdeveloped being short and narrow; or rarely, both jaws may be equally overdeveloped, being wider and longer than normal. About 70 per cent of all malocclusion falls in class 1. Class 2 is characterized by a distal relation of the lower arch as compared with the upper arch, either unilateral or bilateral. It is characterized by a long narrow upper arch with an underdeveloped mandible. It may or may not be associated with mouth breathing. About 25 per cent of malocclusion falls in this class. Class 3 is characterized by a mesial relation of the lower arch either unilateral or bilateral. The mandible is overdeveloped, usually longer and wider than normal, and the maxilla is underdeveloped, being short and narrow. In medical terminology this condition is called a prognathous jaw, and about 5 per cent of malocclusion falls in this class. Dental arches that are short and narrow will have a high and narrow palate. The floor of the nose will, therefore, be narrow, the sinuses underdeveloped and the teeth will be crowded or protruding. The tongue will not take its normal position in the roof of the mouth and will not exert its normal pressure on the lingual surface of the teeth and the bone, but is carried in the floor of the mouth inert. The mandible sags, the lips and cheek muscles function less and there is a lack of muscle tone from within and outside the denture.

With this brief sketch of malocclusion and the characteristics of the bone formation, one may readily note that a large percentage of malformation involves the underdevelopment of the maxilla in width and length. This fact I believe is of interest to the otolaryngologist. The orthodontist and the otolaryngologist are both treating children and are dealing with the problem of establishing normal function so far as it may be possible. When a child is presented to the orthodontist, he includes in the case history, such observations as follows: Is there any history of nose and throat trouble? Has there been any operation for adenoids and tonsils, or other operations on the nose or throat? If so, by whom, when and where performed? What is the condition of the nose and throat now? Is normal respiration possible? If this is not found to be so, the patient is referred to the otolaryngologist for examination and for such treatment and operation as may be necessary to clear the conditions of the nose and throat. The orthodontist keeps a record of the height and weight of the patient at intervals during the

entire period of management and observation. It is frequently necessary to refer the patient also to the pediatrician, the dermatologist and the internist to improve general physical conditions. We are much concerned in having normal metabolism if such is possible.

Conditions of the nose and throat, the habit of mouth breathing, the sucking of the thumb, lips, tongue and other similar habits fall toward the end in the scale of etiology of malocclusion in point of frequency. Yet in any given case of malocclusion when such is the principal etiologic factor of the disturbance in balance of the normal forces, it becomes the most important factor, not only in the management of the malocclusion at the time, but for the future development of the face and jaws and, in fact, the entire individual.

We are constantly asked the question, "When is the proper time to treat persons for malocclusion?" This may be answered, in general terms, that malocclusion should be treated as early as it is recognized. There are certain periods of growth in the jaws which should be considered. When possible, the management should be completed by the time the growth of the jaws is completed, which is at the age of 14, except for the third molars. Orthodontia management may be completed in periods of a few months for each period of growth. I do not mean to infer that malocclusion cannot be managed after 14 years of age or managed successfully, but the periods of treatment are longer and the total time of wearing appliances may require from two to three years. The ideal time is during the periods of growth when the osteoblastic and osteoclastic cells are most active.

The deciduous denture, unless mutilated as in cleft palate and harelip, is usually normal at birth, and the unerupted teeth are in normal position. At the age of 2, 3 or 4, however, there may occur an underdevelopment or an overdevelopment of the mandible in respect to the maxilla which indicates a beginning class 2 or class 3 malocclusion. This may mean hypertrophied adenoids or tonsils or both. Either of these conditions should be treated first by the otolaryngologist. The removal of adenoids and tonsils may, in some instances, prevent the establishing of a malocclusion, but if the malocclusion is established, the clearing of the nose and throat will not in itself correct the underdevelopment or the overdevelopment of the bones involved. Either of these conditions may be and should be treated by the orthodontist before the absorption of the deciduous roots has taken place in the physiologic transition from the temporary to the permanent denture.

The next period of development is at the time of the eruption of the first permanent molar and the eight incisor teeth at about 6 years of age. If functions and development have not been normal, the first permanent molars will not occlude normally. The same forces governing the normal development of the bones are equally powerful in increasing the inharmony which takes an impetus at this time. This is an important time for management by the orthodontist.

In each succeeding period of growth, i. e., the eruption of the bicuspids, the cuspids and the second permanent molar, the inharmony, if not previously managed and normal influences established, continues with increasing symptoms in deformity and inharmony until the maximum has been reached. The maxillary and other sinuses involved and the nasal passage will have a minimum development rather than their normal development, thus making it physically impossible for the individual to perform the normal functions of normal respiration and mastication.

DISCUSSION

DR. GEORGE J. DENNIS: I wish to express my appreciation of this interesting paper. I thought that the effect of irregularities of the teeth on the nose and throat was definite. I do not see the relationship between respiration and the function of the jaw in normal occlusion, but in an abnormal development, this is marked. The question of irregularity of the teeth should be considered before birth, for dentists often see a child with its father's large teeth and its mother's small mouth. Prenatal influences have much to do with this.

There are three definite classes of malocclusion and of occlusion: (1) a short and fairly wide jaw both below and above with fairly good occlusion; (2) the

projection of the incisor teeth, with narrowing of the upper jaw and widening of the mandible and (3) protrusion of the lower jaw with the incisors closing over the upper incisors. This, I believe, has a certain effect on the nose and throat. In the first class one often finds a hypertrophic condition of the nose and throat; in the second, a narrowing of the nares and compression of the maxillary sinus so that they extend below the floor of the nose; in the third, there is apt to be atrophic conditions, with widening of the nose. Especially in classes 2 and 3 there is an effect on the laryngeal and pharyngeal mucosa, probably most marked in class 2, and in these cases there is usually shortening of the upper lip. When this condition is present, there is likely to be a pharyngitis and intractable laryngitis until the occlusion of the teeth is corrected.

First teeth are usually regular, but with the eruption of the sixth year molars, there is departure from this regularity which is caused in most instances by caries of the first and second deciduous molars.

Dr. Edwin McGinnis: I saw a case of marked malocclusion of the incisors, high arched palate and sunken nares as the result of destruction of the soft palate and shrinking of the scar tissue resulting in mouth breathing. In an operation for adenoids, the soft palate had been removed. Dr. Brophy attempted to remedy the condition, without much change in the end-result. This child, now aged 12, had a chronic infection in all of the nasal accessory sinuses and almost total closure of the nasopharynx.

Dr. Elmer L. Kenyon: One important purpose of the paper is to obtain cooperation in the matter of etiology between the rhinologist and orthodontist. There is an immediate relationship in the development between the nose, jaws and teeth, and an intimate joint study should be carried on by the rhinologist, the orthodontist and others. Dr. Sippy had stated that the projecting upper jaw resulted when the normal upward pressure of the tongue against the palate was made impossible by the dropping of the lower jaw for mouth breathing. This occurred usually because of adenoids. If this is true, it is time for the two specialists to work together early enough by removal of adenoids, so that this deformity could not occur; but I cannot understand how the light pressure of the tongue as normally exerted could have such a marked effect as Dr. Sippy thought on the formation of the jaw. Recently my attention was called to experiments on two young monkeys to determine what would happen if in one animal vitamin "B" was removed from the diet and in the other it was retained. The monkey receiving the vitamin "B" developed well, had rounded features, and the other became extremely atrophic, was small and had irregular teeth. I wonder if the partial absence of vitamin "B" might not account for some of the irregularities seen in dental occlusion in man.

In one instance of cleft palate with malocclusion, the patient improved in speech as the malocclusion was corrected, and I believe that all of the articulative defects present in malocclusion can occur when there is perfect occlusion and a perfect palate. Speech is fundamentally a matter of intelligence. I see almost no deformities with malocclusion in which there is a disorder in speech which cannot be corrected without correcting the irregularity of the teeth. The malocclusion serves not so much to prevent normal articulative development as it does to discourage the child from making sufficient effort to overcome the not impossible handicap of irregular teeth.

Dr. Austin A. Hayden: I am greatly interested in Dr. Sippy's remarks. Many patients are operated on for the relief of mouth breathing. Most of the operations are successful, but some fail to restore nasal breathing, not because the operation is not well done but because some of the defects Dr. Sippy has pointed out were present and their importance was not realized. To prevent the chagrin of an unsuccessful operation there is a definite field for cooperation between the otolaryngologists and orthodontists, as the essayist has contended. In addition to the pressure of the tongue being a factor in the spreading of the upper jaw, I believe that there is an additional factor in the forcible pressure between the maxilla and mandible in chewing.

The first lesson to be learned from the paper, and the first benefit to be obtained is the early recognition of these cases by the otolaryngologist before operation is performed. A statement by him to the patient, or the family, that the mouth breathing will probably not be corrected by removal of obstruction alone, but must be followed or perhaps preceded by correction of the deformities should always be made.

I am particularly interested in the effect that the widening of the upper jaw has on the widening of the nose, particularly in the region of the posterior nares. I believe that many failures in operating for the correction of mouth breathing are due to the fact that the width of the posterior coanal openings are not measured before the operation is attempted. The size of this opening is fully as important as a deflected septum or an obstructing turbinate. If a small coanal opening is discovered and there is a chance for widening the upper jaw, thus correcting this defect, the orthodontist has brought something new to the medical profession.

Dr. Burne O. Sippy: Orthodontists do not know all that they would like to know regarding the development of human anatomy, of the physiology of respiration, of diet and of endocrinology. Not enough is known about these things at present to permit of clearcut statements, and members of the medical profession must do more research work along these lines, as they are trying to encourage orthodontists to do along the lines of a better understanding of deformity. I think that there is good evidence to show that the theory of the large teeth of the father and the small mouth of the mother as a cause of malocclusion has been exploded.

The question of Dr. Kenyon in regard to the amount of force of the tongue against the palate was not answered. This pressure is present to a greater or less degree all the time when one is breathing through the nose. The more vigorous and continuous the breathing, the greater is the pressure, but the moment the lips are opened, the tongue drops to the floor of the mouth and is inert.

Referring to the remarks of Dr. McGinnis, orthodontists not infrequently see cases in which the uvula has been removed with the adenoids, and it is necessary to try to restore the speech and other functions as well.

COLLEGE OF PHYSICIANS OF PHILADELPHIA, SECTION ON OTOLOGY AND LARYNGOLOGY

Regular Meeting, March 21, 1928

James A. Babbitt, M.D., *Chairman*

SYMPOSIUM: SIGMOID SINUS THROMBOSIS

Diagnosis. Presented by Dr. S. MacCuen Smith.

There should be no difficulty in establishing a diagnosis in a simple, uncomplicated involvement of the lateral sinus, but this characteristic clinical picture broadly means septicemia and must be differentiated from sepsis originating in some other part of the body, before surgical intervention is undertaken. Certain types of meningitis, central pneumonia, endocarditis, typhoid fever, malaria and pyelitis in children are to be eliminated as a causative factor when complicating an active or inactive suppurative aural disease, but once diagnosis is reasonably assured, the surgeon should lose no time in verifying his suspicions by surgical measures.

A perisinuous abscess is frequently found when wholly unexpected during a mastoid operation and should not be disturbed unless definite symptoms of septicemia occur, for in many instances the mild pyemic symptoms entirely disappear following the mastoid operation.

The importance of the small veins in the tympanum and mastoid cells that communicate directly with the sigmoid sinus, which is primarily invaded by pathogenic organisms on account of its anatomic position, is not always appreciated.

When death occurs it cannot be attributed to the primary sinus thrombosis, but to the entrance of infection into the blood stream. In almost all surgical otology we are working in a field of sepsis, so that it becomes a relatively simple process, in cases of dehiscence, for the infection to enter the jugular bulb or be carried to the sinus through the small vessels of the mucosal lining or thin bone.

In an involvement of the facial vein there is edema of the face, whereas an implication of the cavernous sinus is manifested by exophthalmos and edema of the lids. Thrombosis of the jugular bulb frequently produces paralysis of the pneumogastric nerve, causing dyspnea and hoarseness.

The operator is responsible for a number of sinus thrombosis, due possibly to injury by a spicula of bone being carelessly wiped off an exposed sinus. A case of this nature was described.

Sinus thrombosis is to be suspected when the posterior part of the mastoid is chiefly involved, as manifested by pain on pressure and some edema perhaps over the emissory vein. Phlebitis of the lateral sinus is rare in infants and in extremely old persons.

Diagnosis deals with symptomatology of two sorts, both local and systemic. Sudden cessation of discharge in chronic otorrhea is indicative of several complications, among which may be sinus thrombosis. Marked pain over the tip of the mastoid and extending down to the posterior cervical triangle, indicates that the vein is involved.

Local suffering may be slight or excruciating and may radiate over any part of the head or neck. Torticollis and cervical and retromandibular pain assure involvement of the jugular vein. During the early stages of thrombotic development, the patient is practically symptomless. A high postoperative temperature after mastoidectomy in children should not cause anxiety unless it persists. Neuroretinitis is not a reliable sign and is noted only during the later stages.

The classical symptoms of sinus thrombosis are pain about the region of the mastoid; a chill, with sudden rise of temperature to 105 F. or higher; nausea and vomiting, although the latter is not projectile as in meningitis; increased pulse rate followed by sweating, and a high polymorphonuclear percentage and leukocyte count. In uncomplicated cases a clear mentality is one of the most characteristic symptoms of sinus thrombosis, differentiating it from otitic abscess of the brain and meningitis. A pulsating movement may be transmitted to a sinus through the engorged arteries of a hyperemic dura, and is, therefore, of doubtful diagnostic value.

Suspicion of sinus thrombosis should be immediately awakened if an acute exacerbation with chills and rise in temperature occur during chronic otorrhea, especially when violent remissions and copious sweating occur. A fair percentage of thrombi are innocuous and the patient may exhibit a good general condition with normal mentality but have chills and a range of temperature between 102 and 106 F. Should metastases occur, the picture immediately changes; the patient looks and feels ill, the temperature reaches exceptional heights without the abrupt drop in uncomplicated thrombosis, and he becomes increasingly indifferent to his environment.

Blood cultures should be made, but it is often unwise to await the result. A negative culture does not exclude sinus thrombosis.

Given a typical case, with other sources of bacteremia eliminated, surgical intervention is indicated. Recovery depends almost entirely on early operation. A free incision of the wall of the sinus is the only certain means of determining the presence of thrombosis in cases in which the condition is strongly suspected.

USE OF THE MANOMETER. Presented by DR. FRANCIS C. GRANT.

The Queckenstedt test and its modifications depend on the result of mechanical interference with the venous return from the cranial cavity which produces a momentary increase in intracranial and intraspinal pressure. In 1916, Queckenstedt demonstrated the fact that following compression of both jugular veins, a marked rise occurred in the fluid tension at the site of the lumbar puncture. The Toby-Ayer test, a modification of the Queckenstedt test, determines which lateral sinus is obliterated by thrombosis. The lateral sinus empties directly into the jugular vein; a great part of the blood passing through this vein comes from this sinus. If for any reason blood through one lateral sinus is impeded, less blood passes through the jugular vein on that side. Hence, if less blood flows through this vein on one side, its compression will cause but little damming back of blood within the cranial cavity and relatively slight rise in intracranial and intraspinal tension. The jugular vein on the normal side carries a relatively increased amount of blood. Compression of this vein should produce an increase in intracranial pressure comparable to that obtained when both jugular veins are compressed. The test depends on a comparison between the results obtained on compression of the suspected and apparently normal veins. The technic does not differ in any way from the usual determination of the Queckenstedt test. Toby advises that a water manometer be used. The Freemont-Smith manometer really used spinal fluid for the column of liquid and these types are more accurate than the mercury containing types.

Proper compression of the jugular veins was discussed. A number of kimographic tracings of such tests prepared by Dr. James Gardner of the Frazier Clinic were shown. Nine cases were discussed, seven in which the test proved correct, one in which it probably was correct but unconfirmed, and one in which the symptoms were misinterpreted. Dr. Grant urged earlier and more frequent use of the test in the diagnosis of lateral sinus thrombosis.

SURGICAL TREATMENT. Presented by DR. CURTIS C. EVES.

Free exposure of the sinus should be made before attempting to incise the sinus. A broad curet best accomplishes the final thinning of the bone over the sinus. A more rapid and accurate method, in experienced hands, for the removal of the initial portion of the sinus plate, is accomplished by the use of a flat chisel about ¼ inch in width. The bone engaged is lifted by lowering the handle of the chisel and removing the chips with forceps. A small curved rongeur with blunt, rounded tips, removes the remaining bone quickly and safely.

The sinus should not be opened before free exposure is obtained. The incision, when made, should be free to permit adequate inspection. Bleeding may be controlled with small hard pledgets of iodoform gauze, the thickness of a lead pencil and about ⅜ of an inch long. Larger pledgets, 1 inch square, should be available for emergency.

If a clot is removed for about 1 inch back of the knee, practically no troublesome infection extends beyond. No attempt should be made to remove the clot from the bulbar end without first ligating the internal jugular vein.

Treatment of the Jugular Vein.—Three methods were described.

1. In cases without symptoms of general infection before operation, but in which a thrombosed sinus is found at operation, the diseased walls of the vein is dissected away and packed lightly for drainage. The jugular is not ligated unless there are symptoms of infection of the blood stream.

2. In cases in which acute septicemia or pyemia develop previous to operation, simple ligation of the jugular vein should be performed, as soon as sinus disease is demonstrated.

3. In cases of class 2, in which the jugular vein is exposed and a clot in the vein or inflammatory adhesions surrounding the vein are found, the vein

is dissected out to the lower limit in the neck. The surgical requirements in the treatment of sinus infection are removal of the cause, and limiting the extension of the infection.

INTRAVENOUS THERAPY. Presented by DR. HAROLD W. JONES.

The treatment of infection of the blood stream in sigmoid sinus disease is essentially the same as infection of the blood stream in general. An attempt may be made to sterilize the blood, prevent or inhibit the growth of bacteria, remove bacteria by bleeding and replacing with normal blood, give the patient immune bodies, or supply new blood to combat the anemia.

Dyes, such as aniline gentia violet or acriflavine, arsenicals, sodium cacodylate, mercurials, iodine (Pregel's solution), serum or blood transfusion were discussed. These substances not only affect the bacteria themselves, but stimulate the protective forces of the body. In six cases in which 4-intro-3, 5 bio acetoxy mercuri-2 cresol and transfusion were employed, the blood cultures were negative after two or three injections. The chief indication for transfusion is the presence of secondary anemia. Exsanguination transfusion is practical only in very small children. Blood from immunized donors does not produce unusual benefits.

Toxic symptoms with acriflavine and mercurochrome-220 soluble are encountered, while with 4-intro-3, 5 bio acetoxy mercuri-2 cresol in proper dosage, reactions are rare.

Removal of infection from the circulating blood does not always mean improvement. A patient in point died of cavernous sinus thrombosis although the blood had been rendered sterile. Moreover, in seemingly hopeless cases of infection of the blood stream, the patients may recover spontaneously. Transfusion and intravenous therapy cannot replace skilful surgical treatment of sinus thrombosis, but transfusion may improve the general condition and shorten convalescence.

Intravenous medication alters blood agglutinins so that clumping of the donor's cells may result. The patient and the donor, therefore, should be crossed before each transfusion.

Intravenous medication was urged as a rational therapeutic measure.

DISCUSSION

DR. B. ALEXANDER RANDALL: Where thrombosis is the most striking feature, one may be certain that infection has preceded the thrombus. The removal of the focus is indicated because of this infection. There is usually a sterile thrombotic mass at either end. The vein is the focus of most of the infection. Frequently, a needless amount of infected vein is left behind where the sinus wall should have been removed.

There is some essential difference between the acute and chronic suppurations of the ear. In the case of the acute ones, the knee of the segmoid and the bulb of the jugular are involved, particularly in children. I have seen just as many cerebellar abscesses as cerebral abscesses in these cases, but they are all a frequent cause of cerebellar abscess. Clearcut symptoms are often misleading and the diagnosis is not as simple as the accurate statements frequently indicate. A hectic temperature, however, means involvement of serous membrane.

The first operation for sigmoid sinus disease was performed in Philadelphia by Dr. Ashhurst. The case was one of thrombotic obstruction in the lateral sinus; the operation was performed ten years before the method was discussed on either side of the Atlantic.

DR. NATHAN P. STAUFFER: Not all cases are typical. Three patients whom I have in mind did not have chill, were clear mentally and had headache as the chief symptom, and yet all three had clots at operation. In one case, a child, the lateral sinus and the jugular vein were full of pus at operation.

Pressure must be exerted carefully to elicit symptoms. In three of my cases the manometer was of value. One of these was not confirmed, but I think it is a valuable diagnostic aid.

Cure was obtained in three cases by transfusion. Transfusion was performed twice in the first case because of continuance of headache. In another case, that of a child, two transfusions were given before operation and none after. I am a convert to blood transfusion in these cases.

DR. FIELDING O. LEWIS: A patient with lateral sinus thrombosis associated with streptococcic infection of the blood stream was treated with 4-intro-3, 5 bio acetoxy mercuri-2 cresol and transfusion. Following the administration of this drug there were definite symptoms of nephritis, but they cleared up several days later.

The temperature dropped but was not flat, and in the past two days the patient has shown symptoms of encephalitis. Dr. MacEwan Smith used gentian violet and the patient seems to be improved.

DR. GEO. M. COATES: Diagnosis of this condition is difficult. The laboratory aides are important, especially the blood culture. The negative blood culture is of no help, but the positive blood culture is helpful. However, a culture immediately after operation may show bacteriemia when real infection may not be present. The interpretations depend on the time when the blood culture was taken. The blood culture may be negative between chills, while during chills, it may be positive. We should consider not only the leukocyte count but the percentage of hemoglobin and red cell count as well. The latter two go down progressively in streptococcic infections. The manometer has not been successful in my cases, but this is probably due to an error in technic.

In my experience, transfusion has given better results than any other procedure. Concerning the use of immunized donors, I think a case in point will be of interest. A child 2 years of age was operated on and was transfused from the father. Improvement followed, but later the temperature went up again. The mother's blood was used for a second transfusion and the temperature remained normal. It was found that the mother had had a streptococcic infection several years before. I should like to ask Dr. Mackmull if he considers this a case of retained immunity?

In consultation with a pediatrician, I saw a case of apparent sinus thrombosis. Although it was almost a typical case, nothing was done. The patient got entirely well without treatments. I should like to ask Dr. Eves why he severs the jugular vein after tying. It seems to me that severing this vein adds to the danger of spreading infection (descending phlebitis). It is often remarked that the wrong jugular vein may be ligated. Cases in which ligation of both jugulars were not followed by harm are reported, but in one case reported there was an interval of a week between the ligations; thus collateral circulation was allowed to develop.

I should like to ask Dr. Grant what effect the administration of magnesium sulphate would have on the manometer reading.

DR. ROBERT HUNTER: I think the water manometer is safe in Dr. Grant's hands, but I believe that in average hands the Quincke manometer is safer because of the rubber connections. The necessity of careful sterilization is another point in favor of the Quincke apparatus. We desired to eliminate the possibility of sinus thrombosis in a patient with symptoms of meningitis. A smear from the spinal fluid showed a few bacteria, but cultures from the spinal fluid did not show any growth. We decided to operate because the other symptoms did not contraindicate operation. We were forced to speculate as to whether the manometer had been clean. I am wondering, therefore, if when the spinal fluid rises in the manometer on jugular pressure, the fluid, in later dropping back on the release of pressure, does not reenter the spinal canal and offer chances of infection.

DR. JAMES A. BABBITT: I think Dr. Mackmull's quantities as to dosage in intravenous therapy are of sufficient importance to warrant repetition.

DR. MACEWEN SMITH: It has been my custom to use the Alexander chisel, striking it with a hammer so that the end is brought up with each blow and in this way no damage can be done. The wall must be removed without injuring the sinus. The safest procedure is to take this off parallel with the sinus. I believe it is well to prepare for the bleeding as Dr. Eves has suggested. Where there is free bleeding, it is not always necessary to ligate the jugular vein. Free bleeding from each end probably washes out all the infection. I have seen a number of patients get well without ligation. As long as the endothelium is not involved, it is remarkable how much of the wall of the sinus may be involved without thrombus formation.

DR. GRANT: Average care in sterilization should eliminate danger of infection in the use of the manometer. Rarely, even in inexperienced hands, is infection produced in the many instances of routine lumbar puncture.

DR. CURTIS C. EVES: I always feel safer when alcohol is used on severing the vein. I must confess that I have had no experience with the lip Dr. Hunter mentions. Dr. Smith suggests plugging under the bony walls before opening the sinus. Pushing the plug down may loosen the clot and thus get it into the circulation. In one case the vein became occluded down into the neck.

DR. MACKMULL: Certain antigens, such as those in scarlet fever, are known to persist many years. The case suggested by Dr. Coates may be of this order.

As to the dosage of 4-intro-3, 5 bio acetoxy mercuri-2 cresol intravenously, we use 0.5 cc. of a 1:1,000 aqueous solution per kilogram of weight in children, and in adults we use 10 cc. of a 1:1,000 aqueous solution irrespective of the weight of the person.

Book Reviews

DISEASES OF THE LARYNX. By HAROLD BARWELL, M.D. Pp. 278. New York: Oxford University Press, 1928.

This is the third edition of this book — the first and second issues having appeared in 1907 and 1910. The present edition, in addition to the diseases of the larynx, includes diseases of the trachea, larger bronchi and esophagus. The established facts concerning the diseases of these parts are set forth clearly and concisely.

Under methods of examination are included both indirect and direct laryngoscopy and the examination of the bronchi and esophagus by direct inspection. The relative values of indirect and direct laryngoscopy in diagnosis, as well as in the treatment of diseases of the larynx, are clearly brought out. The common pathologic conditions of the larynx are well presented by a series of drawings made by the author himself. The statements set forth in the book bear clearly the evidence of having come from an experienced clinician. On page 148, however, appears the statement that in traumatic paralysis of the vocal cords — that following operations on the thyroid — "the cord, of course, assumes at once the cadaver position." As a matter of fact, the fixation of the cord in the median position, that assumed on phonation, is the usual position of the cord after such operations and, as a rule, the cord tends to remain indefinitely in the median position.

In a concluding chapter, the author describes the operations of intubation, tracheotomy, laryngotomy, laryngofissure, laryngectomy, subhyoid pharyngotomy, lateral pharyngotomy, esophagotomy and diathermy.

The reviewer recommends the book highly, both for the student of general medicine who is seeking a general acquaintance with the various ailments of the body and for the physician who is devoting himself to the practice of laryngology.

OTO-LARYNGOLOGIE AVEC APPLICATIONS A LA NEUROLOGIE. By F. J. COLLET, Professor of Otolaryngology Faculty of Medicine, Lyons. Pp. 1,110, with 294 figures and 4 colored plates. Paris: Gaston Doin & Cie, 1928.

This is a comprehensive presentation of the diseases of the upper respiratory tract and of the ear. The material is presented in the clear, systematic manner which the French know so well how to use. There is no effort to include references from the literature; it is rather the presentation of conclusions arrived at by the author. The illustrations appear to be original, and are not prepared with the artistic skill characteristic of American publications.

Directory of Ophthalmological and Otolaryngological Societies

INTERNATIONAL

FIRST INTERNATIONAL OTO-RHINO-LARYNGOLOGICAL CONGRESS

President: Prof. E. Schmieglow, University of Copenhagen.
Place: Copenhagen, Denmark, Time: July 29-Aug. 1, 1928.

NATIONAL

AMERICAN MEDICAL ASSOCIATION, SECTION ON LARYNGOLOGY, OTOLOGY AND RHINOLOGY

Chairman: William V. Mullin, Cleveland Clinic, Cleveland.
Secretary: Dr. Gabriel Tucker, Bronchoscopic Clinic, University Hospital, Philadelphia.
Place: Portland, Ore. Time: July 8-12, 1929.

AMERICAN BRONCHOSCOPIC SOCIETY

President: Dr. C. J. Imperatori, 17 E. 38th St., New York.
Secretary-Treasurer: Dr. Louis H. Clerf, 128 S. 10th St., Philadelphia.

AMERICAN LARYNGOLOGICAL ASSOCIATION

President: Dr. Bryson Delavan, 40 E. 41st St., New York.
Secretary: Dr. George M. Coates, 1721 Pine St., Philadelphia.

AMERICAN LARYNGOLOGICAL, RHINOLOGICAL AND OTOLOGICAL SOCIETY

President: Dr. Hill Hastings, 1136 W. 6th St., Los Angeles.
Secretary: Dr. R. L. Loughran, 33 E. 63d St., New York.

AMERICAN OTOLOGICAL SOCIETY

President: Dr. J. Gordon Wilson, 104 So. Michigan Ave., Chicago.
Secretary: Dr. Thomas J. Harris, 104 E. 40th St., New York.

AMERICAN ACADEMY OF OPHTHALMOLOGY AND OTO-LARYNGOLOGY

President: Dr. Luther C. Peter, Physicians Bldg., Philadelphia.
Secretary: Dr. William P. Wherry, Medical Arts Bldg., Omaha.
Place: Hotel Statler, St. Louis. Time: Oct. 15-19, 1928.

LOCAL

THE COLORADO OTO-LARYNGOLOGICAL SOCIETY

President: Dr. C. Howard Darrow, Metropolitan Bldg., Denver.
Secretary: Dr. Harold L. Hickey, Imperial Bldg., Denver.
Place: Assembly Room of Metropolitan Bldg. Time: First Saturday of each month from October to May.

SECTION ON OPHTHALMOLOGY AND OTO-LARYNGOLOGY OF THE MEDICAL SOCIETY OF THE DISTRICT OF COLUMBIA

Chairman: Dr. Walter A. Wells, The Rochambeau, Washington, D. C.
Secretary: Dr. J. N. Greear, Jr., 1740 M St., Washington, D. C.
Place: 1718 M St., N. W. Time: 8 p. m., third Friday of each month.

ATLANTA ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

President: Dr. Arthur J. Fort, Medical Arts Bldg., Atlanta, Ga.
Secretary: Dr. Leon E. Brawner, 157 Forrest Ave. N. E., Atlanta, Ga.
Place: Academy of Medicine, 38 Prescott St. N. E. Time: 8 p. m., last Thursday of each month.

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY

President: Dr. Arthur M. Corwin, 25 E. Washington St., Chicago.
Secretary: Dr. Austin A. Hayden, 25 E. Washington St., Chicago.
Place: Grill Room, Stevens Restaurant, 16 N. Wabash Ave., Time: 6 p. m., first Monday of each month from October to May.

INDIANAPOLIS OPHTHALMOLOGICAL AND OTO-LARYNGOLOGICAL SOCIETY

President: Dr. Thomas Hood, Hume-Mansur Bldg., Indianapolis.
Secretary: Dr. Kenneth L. Craft, Hume-Mansur Bldg., Indianapolis.
Place: University Club. Time:: 6:30 p. m., second Thursday of each month from October to May.

NEW ORLEANS OPHTHALMOLOGICAL AND OTOLOGICAL SOCIETY

President: Dr. J. Raymond Hume, Maison Blanche Bldg., New Orleans.
Secretary-Treasurer: Dr. W. A. Wagner, Pere Marquette Bldg., New Orleans.
Place: Eye, Ear, Nose and Throat Hospital, New Orleans.
Time: 8 p. m., third Thursday of each month from September to June.

SECTION ON OTOLOGY AND LARYNGOLOGY OF THE BALTIMORE CITY MEDICAL SOCIETY

Chairman: Dr. Edwin N. Broyles, 1100 N. Charles St., Baltimore.
Secretary: Dr. Waitman F. Zinn, Medical Arts Bldg., Baltimore.
Place: 1211 Cathedral St. Time 8:30 p. m., last Friday of each month.

DETROIT OTO-LARYNGOLOGICAL SOCIETY

President: Dr. Ray Connor, Stroh Bldg., Detroit.
Secretary-Treasurer: Dr. William Fowler, Maccabees Bldg., Detroit.
Place: Maccabees Bldg. Time: Third Wednesday evening of each month from October to May.

THE KANSAS CITY EYE, EAR, NOSE AND THROAT SOCIETY

President: T. S. Blakesley, Lathrop Bldg., Kansas City, Mo.
Secretary: Dr. A. E. Eubank, 636 Argyle Bldg., Kansas City, Mo.
Time: Third Thursday of each month from September to May; the November, January and March meetings are devoted to clinical work.

NEW ENGLAND OTOLOGICAL AND LARYNGOLOGICAL SOCIETY

President: Dr. Gordon Berry, 19 Elm St., Worcester, Mass.
Secretary-Treasurer: Dr. Calvin B. Faunce, 320 Commonwealth Ave., Boston.

ACADEMY OF MEDICINE OF NORTHERN NEW JERSEY SECTION ON EYE, EAR, NOSE AND THROAT

Chairman: Dr. Henry C. Barkhorn, 45 Johnson Ave., Newark, N. J.
Secretary: Dr. Lee W. Hughes, 1019 Broad St., Newark, N. J.
Place: 91 Lincoln Park, South. Time: 8:45 p. m., second Monday of each month.

THE SECTION ON LARYNGOLOGY AND RHINOLOGY OF THE NEW YORK ACADEMY OF MEDICINE

Secretary: Dr. Arthur Nilsen, 40 E. 41st St., New York.
Time: 8:30 p. m., fourth Wednesday of each month from October to May.

THE OTOLOGICAL SECTION OF THE NEW YORK ACADEMY OF MEDICINE

Chairman: Dr. J. L. Maybaum, 12 E. 86th St., New York.
Secretary: Dr. R. T. Atkins, 4 W. 53d St., New York.
Place: 103d St. and Fifth Ave. Time: Second Friday of each month from October to May.

EASTERN NEW YORK EYE, EAR, NOSE AND THROAT ASSOCIATION

President: Dr. J. Ivimey Dowling, 116 Washington Ave., Albany, N. Y.
Secretary-Treasurer: Dr. L. Prescott Brown, 33 Bancker St., Albany, N. Y.

CINCINNATI OTO-LARYNGOLOGICAL SOCIETY

President: Dr. Walter Murphy, 707 Race St., Cincinnati.
President-Elect: Dr. Charles C. Jones, 19 Garfield Pl., Cincinnati.
Secretary-Treasurer: Dr. Harris H. Vail, 24 E. 8th St., Cincinnati.
Place: University Club. Time: 6:45 p. m., second Tuesday of each month from October to May.

THE OPHTHALMOLOGICAL AND OTOLARYNGOLOGICAL SECTION OF THE CLEVELAND ACADEMY OF MEDICINE

Chairman: Dr. W. J. Abbott, 8314 Euclid Ave., Cleveland.
Secretary: Dr. A. L. Stotter, 1148 Euclid Ave., Cleveland.
Place: Winton Hotel. Time: Fourth Friday of each month.

PACIFIC COAST OTO-OPHTHALMOLOGICAL SOCIETY

President: Dr. W. J. Mellinger, Santa Barbara, Calif.
Secretary-Treasurer: Dr. Walter F. Hoffman, 817 Summit Ave., Seattle.
Place: Santa Barbara, Calif. Time: April 18-20, 1928.

PHILADELPHIA LARYNGOLOGICAL SOCIETY

President: Dr. Ralph Butler, 2007 Chestnut St., Philadelphia.
Secretary: Dr. Herman B. Cohen, 13th & Spruce Sts., Philadelphia.
Place: College of Physicians. Time: 8:30 p. m., first Tuesday of each month from October to June.

THE SECTION ON OTOLOGY AND LARYNGOLOGY OF THE COLLEGE OF PHYSICIANS OF PHILADELPHIA

Chairman: Dr. James A. Babbit, 1912 Spruce St., Philadelphia.
Clerk: Dr. Curtis C. Eves, 1910 Spruce St., Philadelphia.
Place: College of Physicians. Time: 8:30 p. m., third Wednesday of each month from October to June.

THE MEMPHIS SOCIETY OF OPHTHALMOLOGY AND OTO-LARYNGOLOGY

Chairman: Each member, in alphabetical order.
Secretary: Dr. M. B. Selingstein, 801 Union and Planters Bank Bldg., Memphis, Tenn.
Place: Eye Clinic of Memphis Eye, Ear, Nose and Throat Hospital. Time: 8 p. m., second Tuesday of each month.

EYE, EAR NOSE AND THROAT SECTION OF THE HOUSTON ACADEMY OF MEDICINE

President: Dr. Ray K. Daily, Medical Arts Bldg., Houston, Texas.
Secretary: Dr. L. W. Raney, Post-Dispatch Bldg., Houston, Texas.
Place: Medical Arts Bldg., Harris County Medical Society Rooms. Time: 8 p. m., first Thursday of the mouth from September to June.

FORT WORTH EYE, EAR, NOSE AND THROAT SOCIETY

President: Dr. H. L. Warwick, Medical Arts Bldg., Fort Worth.
Secretary: Dr. A. E. Jackson, Medical Arts Bldg., Fort Worth.
Place: University Club. Time: 6 p. m., first Friday of each month except August.

THE MILWAUKEE OTO-OPHTHALMIC SOCIETY

President: Dr. Charles J. Coffey, 221 Grand Ave., Milwaukee.
Secretary-Treasurer: Dr. Edward R. Ryan, 425 E. Water St., Milwaukee.
Place: University Club. Time: 6:30 p. m., third Tuesday of each month.